

Authentic Science

FICTION MONTHLY 1/6



Brilliant, new two-part novel:

THE BIG HOP by J. T. McIntosh

Other stories by: DAN MORGAN, BRIAN W. ALDISS, JOHN ASHCROFT

ISSUE No. 57
ONE SHILLING and SIXPENCE

Authentic

SCIENCE FICTION MONTHLY

Editor:
H. J. CAMPBELL.
F.C.S., F.R.H.S.,
M.S.C.I., F.B.I.S.

Art Contributors:
J. E. MORTIMER
J. RATIGAN

Cover by
JOHN RICHARDS

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H. J. CAMPBELL

Writes...

Once again I think the contents can speak for themselves this month. We have a fine range of stories and articles, with some rather nice illustrations. What I really want to talk about—once more—is our Poll.

I am thoroughly ashamed of you! Here I am beating my brains out trying to improve this magazine—which means bringing it nearer to what *you* really want—and you behave as though you don't give two pins what goes into *Authentic*.

You were given the opportunity to take part in an experiment. You were given the chance to have a very real say in how this magazine is run. And only a small

fraction of you bothered to bestir yourselves to action! Don't you *care* about what is in the magazine you buy every month? Don't you *want* to play your part in bringing *Authentic* nearer to your heart's desire? Am I to give up worrying about what sort of stories to publish, what kind of articles will please you, whether you would like this or that feature? Maybe I should just publish everything that comes in, instead of rejecting more than ninety per cent. of it, as I do now. Maybe I should just buy the cheapest material going, instead of pursuing my present policy of paying the highest rates possible in order to get high quality stuff.

Or maybe I should just tick you off a bit and give you another chance!

I'll do that. Because I have hope. Because I have faith in you—if only you can be roused from your lethargy!

Now look. The Poll sheet appears again in this issue. Will you, every one of you, *fill it in*? Blow me down, it only costs you three-ha'pence! Surely I'm not asking too much of you? I can assure you that I haven't run this Poll as a mere stunt. I really want to find out how I can improve *Authentic* in such a way that it pleases most readers. I can't do that if I have the views of only a tiny proportion of the readership, can I? So knuckle down to it, friends, and give me a bit of encouragement. If you would feel any better about it, don't bother to give your name and address.

All right. That's that. Now let's be friendly again! One thing that appears clearly from the forms that have already been sent in is that you would like a "Questions Answered" feature. Very well. You shall have it. Start sending me the questions—

making them, if possible, of a kind that will interest other people, too. I will get them answered by experts. Try if you can to limit your questions to specific points that don't require a whole book for the answer.

Dear me! I nearly forgot to point out that we have dropped sixteen pages with this issue. This, I can assure you, is a temporary measure designed to enable us to keep up the illustrated sections during the usual summer drop in sales. The only alternative would have been to raise the price to 2s.—and I'm sure you'll agree that would have been a bit steep just to retain sixteen pages.

Thought you might like to hear about something that is going to surprise quite a lot of people. Scientists of thirty nations are co-operating right now in the setting up of a series of observation posts with the object of studying the Auroras Borealis and Australis. I hope to have more information on this at a later date, but meantime it is nice to see such international amity. What a shame it is that politicians are not as dedicated as scientists!

H.J.C.

Problems developed that the planners
had never dreamed of when humanity prepared for—

The BIG HOP

by J. T. McINTOSH

IT WAS A MATTER OF months, weeks and days now, instead of twenty-three years. The difference between five months and twenty-three years isn't one of degree—it's a difference in kind, when it's a hack out of a human life.

Seven human lives. Plus twelve accumulated on the way.

Andrew was only forty-eight, but at times he felt seventy. Hard work can keep a man young, but responsibility generally ages him. To do Andrew justice, it would have aged most men a lot more.

"You should have had my job, Margaret," he said.

Margaret, who looked as if she had never been young and would never be old, smiled her timeless smile. "Should I? Could I handle Bill?" she asked gently.

Andrew answered the question with another. "Would you say *I* can?"

John came into the control room—called that, by tradition, during twenty-two long years when it might more reasonably have been called the waiting room—and threw down a massive, paper-clipped wad of manuscript.

"My masterpiece," he said drily. "I'll check it for the next five months, of course, but there can't be anything

new except a few further details on the Lærtes system."

Margaret smiled at him exactly as she had smiled at Andrew. She had a son by Andrew and a daughter by John; perhaps that explained it. She didn't speak. Words wear thin with long usage on the same people, so thin that in the end they're not much good any more.

"I wonder if we'll ever know what's been happening on Earth?" John asked for perhaps the five hundredth time since the trip started.

Andrew made the same answer as he had done the last time. It might have been "Mmmm" or "Ummm." At any rate, it didn't commit him much.

There would have been new things to say to each other in new circumstances, but the circumstances had never changed. Although they themselves had changed, they had changed together. The change hadn't registered. They had all practically forgotten that when Margaret had stepped off terra firma she had been so young and pretty that hundreds of press photographers had jostled each other in an effort to infuse a little glamour into the

newspaper coverage of the story of the century.

They were glad when Ben came in, for Ben was only thirty, and each of them knew things that Ben didn't know. Ben had been a child then, unaware of what was going on but proud, pleased and apprehensive at leaving the orphanage which had been his only home.

"Can you make any sort of guess yet," Ben asked, "about how long the ship will stay in Lærtes?"

Andrew shook his head. "It may take off at once, or it may have to wait five years," he said.

"I know, but look—how do you want the ship when we land? Ready for another twenty-three years in space, ready for a quick unload, or what?"

"It doesn't really matter, Ben," said Andrew gently.

"God, what a way to run a starship," muttered Ben. Then abruptly he laughed. "I guess it's the way I'd run it, too, at that. The best way is the easiest way, huh?"

"Everything will come out all right," said Andrew placidly. It wasn't merely a pious hope. It was his philosophy of life.

"I've been thinking about

all the things we could get done, now that we've got gravity at last," said Ben.

"With luck, you'll have gravity for a long time."

Ben looked at him with interest. "You leaving me on Lærtes Four?"

"Not leaving you—staying with you."

"And who takes the ship back—John?"

"John would be seventy when it got there. Bill, probably."

"Mmmm," said Ben. People picked up habits from each other, when the human environment never changed. "I'm glad I'm staying, then."

"Don't say that in other company," said John sharply.

"Think I'm nuts? Jo would tear my eyes out if I said anything against her wonderful Bill."

"Okay," said John. "You're a good boy, Ben."

Ben was surprised—praise from John was a rare thing.

"Mind, it's not certain it'll be Bill," said Andrew. "It's such a big question that if there's any argument we'll have to vote on it. And conditions on Four will have to be counted in before we make any final decision."

"What you say will go," said Ben. "It generally does,

though I've always wondered why."

"He's the captain, after all," John snapped. "What else would you expect—mutiny?"

Margaret smiled at Ben to show him she knew what he meant. Margaret didn't talk a lot, but there wasn't much on the *Hope* that she didn't see, hear and understand.

The reason for the *Hope*—twenty-three years ago, back on Earth—was simple. Earth's weather, a constant source of human complaint for thousands of years, had suddenly become a threat instead of a mere occasional inconvenience. By this time the reasons were probably known. They hadn't been when the *Hope*, the first starship, had left.

Unlike twenty-three years and five months, it was a difference in degree, not in kind. Detroit had had snowstorms before, but never one that buried its 197,000 acres twenty-five feet deep. Holland was used to floods, but not on a scale which terrified the Netherlands, Belgium and every other flat coastal region in Europe. And earthquakes in New Zealand were nothing new, but this earthquake killed a million people.

THE BIG HOP

The *It's a judgment* sects attributed the new conditions to a vengeful God. The superstitious thought vaguely that Earth was in sudden, resentful protest against its exploitation, and wondered if atomics had anything to do with it. And the scientists, unable so far to measure the change and the reasons for it in grams, centimetres and seconds, ran in all directions at once to no great effect. However, these scurrying, disorganised, scientific ants would come up with the answer to the problem of survival, given time.

The *Hope*, though only one of Earth's emergency measures, was possibly the vital one. Men might tame their recalcitrant world, or overcome the oxygen famine of Mars, or build vast cities in space—but, failing all this, Earth's climatic upheaval was serious enough to warrant mankind looking for a new home, and it was the *Hope's* job to find it.

The *Hope's* crew knew perfectly well that if men found some other way out of their troubles, which was not unlikely, the starship's long, epoch-making journey would be just a great adventure, lauded for twenty years and

then relegated to the history books.

However, the whole future of mankind might depend on the *Hope*. Men would hang on for fifty years on Earth—a difficult breed to stamp out, human beings—and then, perhaps, the great star migration would begin.

So while no one on the *Hope* was taking it for granted that his race depended on him, there was always the sobering possibility that it did.

It remained possible that Lærtes Four would not support human life. It was a dwindling possibility, however. The nearer the starship approached, the more rapidly unpleasant possibilities were crossed off, one by one. John, the astronomer, was now prepared to say there was a seventy-five per cent. chance of Four being an Earth-type planet with a mild climate, bearable gravity, reasonable humidity and rich, clean air. And John was no optimist. His seventy-five per cent. would be Andrew's ninety-nine.

"Some day," said Ellen, with the imagination and wisdom of seventeen, "people will just step into a ship, go

pfst through hyperspace, and do a trip like this in three weeks."

"Rubbish," said John, without heat, but with chilling certainty. "I've read books on the so-called space warp, back on Earth—solid, sensible books. And, though I didn't understand every unreal, imaginary function of x , I did manage to grasp this. Assuming you could go into this hyperspace at A and come out at B, the one thing certain about the next time you go in at A is that you *won't* come out at B."

"That would make travel by hyperspace adventurous," said Ellen, laughing.

"That would make travel by hyperspace insane," retorted John. It was one of his misfortunes to take every frivolity literally.

Ellen didn't mind. She was the sunniest-tempered person on board, the only one whom John in his blackest moments could never damp. The contrast was strange, for Ellen was John's daughter.

She was helping him with his masterpiece—everything he had learned to add to the science of astronomy on a twenty-three year trip to Lærtes. The importance of

her help was liable to be underestimated by almost everybody, and John in particular, but that was another of the things that Ellen didn't mind. She had a certain free, fresh intelligence that enabled her to tell when a thing made sense, whether she really understood it or not. Though not even John realised the extent of her effect on his work, he generally did as she suggested, and his diagrams, maps and written theories were clearer and more concise in consequence. Sometimes, too, something she said would make him examine one of his theories more closely—and reject it, though Ellen herself never suggested anything so drastic.

"Bill been bothering you again?" he asked abruptly.

Ellen's smile faded. "Well, yes," she admitted.

"Why let it bother you? Avril's had children by Bill, Andrew, Ben and Alan. You're going by the books, poppet. They're about life in different circumstances altogether. When we started there were eight of us who knew we weren't going to see any new people, except our children, for fifty years. Seventy-five years for most of us, if we lived that long."

"I know," said Ellen, and sighed.

"We want as many strains as we can get. It's not wrong any way you look at it, though the books might make you think so. It's not wrong socially or morally or even legally—we've been officially given the right to make our own laws, and when we do get back to Earth or other people come out here, they can't inflict their laws on us retrospectively. If you——"

"I know," said Ellen again. "It's not that, Pop. Soon I suppose I'll have children by Andrew and Ben—perhaps, when they're old enough, by George, Willie and Bob. I don't mind that any more than anyone else does. But . . . I don't like Bill."

"Bill's all right."

"Yes . . . it's not even that—that I don't like him. I just—can't I have children by the others, not Bill?"

"Well, sure," said John. "Andrew said so. Bill's had four kids already. Your first should be by Andrew, really, before he gets too old. But what does it matter, poppet, even if it is Bill?"

Ellen sighed, not in the least surprised that, after all that talk, John had come back full circle to his original

position. She understood her father well. He was a clever man with every door in his mind tightly shut except those he needed open in his work, a man who said today what he had said yesterday and would say tomorrow, a man who would be sympathetic but could never take the next, the vital, step of putting himself in the other person's place.

Rae came in and looked round anxiously. She had obviously already looked three times in places where the thing she was looking for couldn't possibly be, and now she kept glancing up and down and over her shoulder as if whatever it was was flying about everywhere except where she was looking.

"Who is it you've lost this time?" asked John in a long-suffering tone. "Jack or Dora?"

"Dora," said Rae abstractedly. "And I can't stop her playing with wires . . ."

"She's all right," said Ellen, reassuringly. "She's with Avril, helping to cook dinner."

Rae laughed breathlessly and looked relieved. "A lot of help she'll be. I wish I could handle kids like Avril. They always do what they like with me. Ellen, I've got

something to show you. Like to see it?"

"Now? How about Dora?"

Rae's anxiety had disappeared completely. "Oh, if she's with Avril that's all right. I know it looks as if I'm wishing her off on Avril, but I run myself ragged trying to keep kids in order and Avril does it and three other things at the same time, and can still think about something else. Come on, honey."

"To see what?"

Rae looked secretive, a wait-and-see expression coming over her face. "The beginning of a new era," she said darkly.

Rae was the senior glamour girl of the party. She had been a child of four when it started. At twenty-seven, with three children, she was easily the prettiest brunette in ump-teen light-years, though there wasn't much to be made of that. "If you're one of Nature's near misses," she had said once, "maybe you'd be glad of only limited competition. But I think Nature was right on the target with me, and I'd like a little more competition to prove it."

Her only real competition on the *Hope* was of recent date and came from Ellen.

There was plenty of room on the starship, for accommodation had been allowed for up to thirty. That would have meant five and a half children by each of the women. Edith had died two years out in giving birth to Jo, and after the birth of Joan, Margaret couldn't have any more children, so that cut down the hypothetical population. There were actually seven of the original crew and twelve children, including Ellen. Jo, the eldest of the people born on the ship, had a son by Bill, and Alan, next in the junior seniority, a son by Avril.

Rae led Ellen into her bedroom and dropped luxuriously on the bed. Gravity, like most things, had its advantages and disadvantages, but after all, human beings belonged in a gravity field and were obviously made for it. Ellen stood in the middle of the room a little uncertainly. It was only recently that she had learned to stand or walk, when the gravity of deceleration came on. She was a child of space, and it still seemed strange to her that when she put a thing down it didn't float up again. Like all the youngsters, she had had some bad bruises through

trying to jump or drop or fly about in a gravity field as she had done all her life before it came on.

"What's this newera stuff?" she demanded, interested.

"We're soon going to be on a planet again," said Rae, "and things are going to be different—very different. You won't believe how different. And one of the incidental changes is that we'll become feminine."

Ellen laughed. "We always have been, as far as I know," she observed.

"No—we've only^o been female. That's different. To be feminine, you need mystery. All sorts of mystery. Men mustn't know what you're thinking, or exactly where you are, or what you're going to do, or how you'll react to what they do, or a million other things. There hasn't been any mystery on the ship. The men always know where we are and what we're doing, and they nearly always know what we're thinking."

"You got all this out of books," said Ellen accusingly. "You were only four when the ship left. You couldn't know——"

Rae grinned. "True. But the fact that I was four means

a lot more than you'd think. I've seen Earth, and I remember it. I grew up more like I would have on Earth than you did. When I was a child, the people about me were fresh out of Earth, and remembered it, and talked about it. When you were born we'd been six years out. By the time you were really taking notice, it was sixteen years since any of us had been on a planet."

Ellen nodded, and returned to the more interesting topic. "How are we going to start being feminine?"

"That's easy. We change our clothes. That's all we need to do, for a start."

"Huh?"

"Look at yourself in the mirror, honey."

Obediently Ellen looked at herself in the full-length mirror, but she didn't see anything except what she expected to see.

Clothes on the ship, with its constant temperature, had always been a mere formality. Everyone wore shorts, the only practical garment for free fall. Some of the men wore shirts, some didn't. The women wore blouses or bras.

Ellen saw a trim, slim blonde looking back candidly at her, clean, clear-skinned,

her hair simply parted and brushed out. She knew she was pretty because beauty was comparative, and there was a certain small basis for comparison. She was prettier than anyone on the ship except, perhaps, Rae. So she was pretty.

"All right, I see me," Ellen said. "So?"

Rae got up off the bed, took some things out of a drawer and dropped them on the bed. "Put those on and look again," she said.

"Where did these come from?" Ellen demanded, examining them. "Gee, they're fine. And thin."

"We brought them along. Presumably to wear, sometime."

"But golly, they're . . ." Ellen searched for words, but failed to find any.

"They're feminine," said Rae. "They're *chic*."

"But they'll wear out. They won't stand up to anything for long——"

Rae laughed. "Put them on. See, like this."

BEN FOUND AVRIL IN THE galley with six children round her. Dora and Reg rolled on the floor, gurgling at each other. Jim lay in a cot, looking up at the ceiling

and bringing to bear on life the ponderous wisdom of eleven months. Jerry was tracing designs on the white doors with one finger. Willie and George sat silently on chairs, their legs not quite reaching the ground. George, at twelve, was a little old to be there at all. But he adored Avril, his mother.

"Guess who's taking the ship back," Ben said.

"Bill," said Avril, not pausing in her work.

Ben's face fell. "Did Andrew tell you?"

"No, and he didn't tell Bill, as far as I know. I'm not sure you're supposed to blab it all over the place, either."

Ben went over and dug Jerry in the back affectionately. Jerry was his son, and Avril's. "Long ago," he said, easily, "I learned there was no such thing as a secret on this ship. When anyone says anything to anybody, that's as good as hooking up the public address and shouting it all over the ship."

"That may be so," Avril said drily, "but Bill should get a thing like that from Andrew, not from Willie or George."

"We won't tell unless you

say so," said George, gravely. "But say, Ben, who's going with him? There's Willie and me, of course——"

"See what I mean?" said Avril.

Ben chuckled. "It's just as well everybody knows you've got a heart of gold under that stony exterior," he observed. "Otherwise you could pass for a snappish, frustrated spinster."

Avril, though she had more children than any other woman on the *Hope*, took that as calmly as she took most things. "I don't see much point in speculation," she retorted.

"People do a lot of things in which there's no point. You can't go, and leave your kids . . ."

George looked anxiously at Avril, and looked worried when she nodded in agreement. George had just had his first big psychological shock. He was realising that soon he couldn't be with both Bill and Avril, the two people who mattered most to him.

"Rae, too, for the same reason. And others."

Avril didn't ask what the others were. In the tiny world of the *Hope*, people seldom

had to explain motives. Everybody knew them.

"Jo," said Ben. "That's it. Jo, for a cert. She can take Reg. Bill, Jo, Reg—and who else? It'll need at least four. Another girl."

"We can't spare another girl," said Avril flatly. "Chance hasn't played straight with us so far. We've twelve males and seven females. Margaret can't have any more children, and Dora's two and Joan thirteen. It may be fifty years before another ship gets to Four."

"What do you mean, may be? It's got to be."

"Unless they sent another ship after us."

"Oh. That. I think they'll wait. There would be no reason for a second ship to get through if we didn't. If they sent out another ship, it wouldn't be to Lærtes."

"You can't predict what a world will do. If the winter after we left was mild, people would almost forget us. If it was worse than the one before, they may have sent a dozen ships after us."

George and Willie were listening intently. Conversation on the ship wasn't often on these subjects. At the beginning the talk had all been of Earth, and now at

the end it would all be about Lærtes and Earth. But in the middle it had been about the *Hope* and what went on inside it—nothing else.

"How did you know it was Bill?" Ben asked.

"Common sense," retorted Avril bluntly. "He's the one who cares most about this whole thing. The one who's most determined it'll succeed, the one who's surest it's important, the one who'd do most for it. I think Andrew made up his mind a long time ago. The rest of us have all specialised, but Bill has been kept doing a little of everything. He's the one who, next to each of us, knows most about our jobs. And he——"

She didn't look round, but she knew someone else had come in, and she seemed to know it was Bill. Ben and three of the children had that guilty, almost frightened look that comes of talking behind a man's back and being interrupted by the entrance of the man himself. Avril was unconcerned, but silent.

And George forgot his promise in his nervousness and excitement and blurted out: "Dad, you're the new captain. You've got to take the ship back."

Bill was stocky and tough and black-browed. If all the people on board the *Hope* were gathered together, it would have been obvious that only two had that mysterious thing called *presence*—Andrew and Bill. Andrew's was apologetic and kindly; Bill's was aggressive and powerful.

He wore cord shorts and sandals, nothing else, and his smooth, beautiful muscles, taut and neat under his pale, clear skin, startled everyone occasionally and sometimes frightened one or two of the people on board the *Hope*. For it was so inescapably obvious that if he ever *did* fight anyone, as it so often seemed he was going to do, he could tear him or her apart with his bare hands before his temper cooled.

His brows looked blacker than ever as he looked from George to Avril and Ben. "Well, when it finally comes at least it's definite," he said, in his surprisingly soft voice. "*George* tells me."

"It was my fault you heard it that way, Bill," said Ben. "And it isn't definite. Andrew says it's such a big question that we may vote on it. Conditions on Four will have to be taken into account, too."

"I should imagine," said

Bill. "I must say it's a surprise."

"It didn't surprise Avril, dad," said George, reassured by the mild reception of his news.

"Why not?" Bill asked Avril.

"You shouldn't have heard this way," Avril told him. "And I don't think we should talk any more about it like this. Go and see Andrew."

"Maybe it's as well I heard about it this way. I can do some thinking about it before I do see Andrew. He can't spring it on me."

"Andrew wouldn't want to spring anything on you," said Avril, sharply.

"Wouldn't he, hell! Of course he would, and I don't blame him. If you've got a big job for someone, naturally you try him out and test him in every way you can." He frowned thoughtfully. "I don't know that I want to spend the best fifty years of my life on this ship, between stars."

"You'll do it," said Avril, briefly, "if it's best for the whole operation that you should."

Bill grinned with his eyes. "Thanks, Avril," he said. "That's the nicest thing anyone's said to me for a long

time, though you probably didn't mean it that way."

Rae pushed open the door and came in. "What a crowd," she said, raising her eyebrows. "Oh, Dora *is* there. Come on in, Ellen, and join the party."

They had been staring at Rae, and when Ellen followed her in shyly they stared at her, too.

"Nice?" Rae asked Ben, demurely.

"Ask me again in about a month's time," said Ben, dazedly, "when I've got used to it."

Rae wore a flowered silk dress with a gay sash. She wore no stockings, and on her feet were the usual plain slippers, but the effect was quite unexpected and unfamiliar enough without more to add to it. Ellen was dressed in a red knee-length skirt and a white silk shirt. They both looked much neater and more delicate than usual. They looked like anything but Rae and Ellen.

Ben looked from Rae and Ellen to Avril, and back again. He found that he didn't need a month, after all. "It is nice," he admitted. "Queer, but I like it. I suppose if you were to analyse it, a girl needs variety to be attractive, and we've never had any."

"Bill thinks we're frivolous," Rae declared.

"I think there are more important things," Bill admitted, coldly.

"Sure, but what's that got to do with it?"

Bill shook his head and went out. The atmosphere changed at once. Bill and the subject of conversation before the girls came in were forgotten. The children looked doubtfully at Rae and Ellen. Dora scrambled across the floor and clawed uncertainly at the hem of Rae's frock. Avril put down the things she was holding, wiped her hands on a towel and came across to examine Rae closely. She felt the material, lifted it to see how it hung, looked at it critically and fingered the little plastic buttons.

"Here, hold on!" Rae exclaimed, laughing, as Avril undid the buttons to see what was underneath. "Ben's here."

"What's the difference?" asked Ben, honestly puzzled. Rae was wearing something—not much, but something—underneath the dress, and he couldn't see any reason why Rae should object to opening her dress to reveal a bra when Avril wore a bra with-

out any thought of putting a dress on top of it.

"There is a difference," said Rae, still grinning. "But it's subtle, so of course you wouldn't see it."

"Okay," said Ben. "I'll leave you to that and other subtleties. Come on, Willie, George, Jerry. Let us men get out of here."

Then Avril was free, in her mildly curious way, to examine and feel Ellen's blouse, and try to make up her mind why Rae and Ellen looked so much more attractive in these dainty, impractical things than in the clothes they had always taken for granted.

And still only Rae realised that this was only one of many little things which were going to make the near future very different indeed from the recent past.

Bill didn't speak to Andrew at once. People were inclined to expect Bill always to take the bull by the horns, knowing he was, above all, a man of action. What they failed to realise, sometimes, was that while he would certainly take action on everything that seemed to him to need it, he didn't have to take it right away. Bill was as capable as

Andrew himself of playing a waiting game.

It was some days later that Andrew opened the subject. Andrew knew that Bill knew, of course, and Bill knew that Andrew knew that he knew. Only Andrew and Bill, and perhaps John, would have played out such a situation. Anyone else on the starship would have gone straight to the person concerned and had it out with him.

Andrew, Bill, John and Margaret were in the control room. Lærtes was dead ahead, looking excitingly like the Sun. They weren't really looking directly at it through glass, but the screen gave that illusion.

"How do you feel about taking the ship back, Bill?" asked Andrew casually.

There was no pretence that Bill didn't know exactly what he was talking about.

"Suppose I said I wasn't going to do it?" he asked.

"As a hypothetical question?"

"If you like to call it that, yes."

"I'd ask your reasons, of course. If they were good, I'd think again. If they didn't impress me, I'd order you to go."

Bill nodded. "I'm glad to hear that. It means you know me and understand the situation. I believe it also means you're sure I'm the right man. But I think I should know why you decided on me."

Andrew looked at Margaret, and Margaret nodded. There was nothing furtive about the exchange. Andrew wasn't sufficiently unsure of himself to be worried if people said he was under Margaret's thumb.

"The trip back," he said, slowly, "is in itself rather unimportant. Six or seven of us would be perfectly capable of taking the ship back to Earth, individually. I think you know that, Bill."

"Of course he knows it," John grunted, "and it offends his ego to be sent off on a job that Rae or Alan or Jo could do perfectly well."

"My ego doesn't come into this," said Bill, stiffly.

"Of course it does, Bill," said Margaret, "and there's no need to be ashamed of it. You can't get anyone to do a good job if they don't have pride. You have pride, or you wouldn't be going. Listen to Andrew."

"The trip is nothing," Andrew repeated. "But what

happens after it is vital, and that's what rules the choice. There will be glory——"

"Do you think I care for that?" Bill demanded, sharply.

"You have to care for that. And use it. I chose, not a man to be captain on board the *Hope*, but a man to represent the whole expedition back on Earth. Do you understand, Bill? I don't know what you'll find back there. There's a big range of possibility."

He looked away and seemed to be seeing Earth in his mind's eye. "You may find that the climatic disorder is over and no one is much interested in a mass migration. If that's so, you'll have to accept it, of course. But we'll still want help and reinforcements—you'd have to stress the value and importance of a strong colony on Lærtes Four, appeal to the adventurous spirit, infect others with your enthusiasm for this project just as a project, even if it isn't really needed any more."

Bill wanted to say something, but visibly restrained himself.

"I chose you, of course, because you'd do that. Ben, say, in such circumstances would *try* to do the same

thing, but he wouldn't infect anyone with enthusiasm. You know what I mean?"

"Then, again, you may find that some other solution has been found. Cities under domes on Mars, or underground, or anti-gravity to make Jupiter habitable—there are so many dimly possible things that might have been done that guesses are useless. If that's the case, there will be more interest in Lærtes. Your job will be easier, because if people must change their way of life anyway, a lot of them will want to do it in the grand way—a tremendous journey across light-years to a new star.

"And finally, if Earth really needs Lærtes—then your task will be . . ."

That he should suddenly stop was unexpected, and Bill waited for quite a while before speaking. "It'll be what?" he asked, impatiently.

Andrew smiled. "Only you know, Bill. Do you know yet why I chose you? Because, above all, you've built your life on this whole project. Whatever the circumstances on Earth are, you'll speak for us better than any of the rest of us would. You'll not only speak, you'll fight. I don't have to tell you what to

do or say. You have our mandate to be yourself, to say and do what you like. We think that'll be best for the future of the Lærtes colony."

"Well—all I can say is thank you," said Bill, quietly. "There never was any question of my refusing to go, of course. But having heard that, I *want* to go. I needn't tell you I'll do my very best."

Andrew nodded. "There's another thing, and I don't think we're going to reach agreement on it so easily. This question—how many go back with you, and who they'll be. That doesn't have to be settled just now. Think about it, that's all."

"Why shouldn't we reach agreement on it so easily?"

Andrew smiled. "It would be wonderful if we did. You and I are two commanders, with different goals now. I'm most concerned about the colony, because I'm going to be in charge of it. You're most concerned with the crew for the trip back, for the same reason. So I don't think we can help being at cross purposes a little."

Bill nodded. "Fair enough. I'll think about it. I hope you're wrong."

The *Hope* had always had a morale officer. It was an important appointment, and the morale officer was an important person. There were times on the starship when, for no reason that anyone could immediately pinpoint, things didn't go well, everyone was depressed, and there were frequent quarrels. It was up to the morale officer to find the reason for the depression, or cure it without ever finding the reason. Better still, he could often avert these bad patches by seeing them coming.

John had been morale officer once, but a very poor one. He didn't really understand others, though he could occasionally be quite penetrating. If other people did what he wouldn't have done, they were wrong, that was all there was to it. Rae and Avril had each had two periods as morale officer, and had done the job excellently, in very different ways. Ben had been reasonably good, but not in the same class as Rae or Avril, because he was too easy-going and not conscientious enough.

The present morale officer was Alan, with the assistance of Jo. Certainly neither of them gave the impression

of efficiency. Jo was indifferent and Alan was pompous, incredibly so for his age—twenty.

Alan breezed around the ship, patted children's heads, asked blunt questions, hummed and hawed, wrote things down in a little notebook, and finally held a conference with his assistant.

"We're going to have to do something, Jo," he said, portentously. "I don't know what, yet, but something is needed."

"Why?" Jo asked, without much interest.

"It's this landing business. I've been making a pretty thorough survey, and you know what I think? I think there's going to be pretty general disappointment whatever we find."

Jo became a little more interested. "How do you figure that?"

"Well, we've all grown up living for the day when we land on Lærtes Four. Those of us who have grown up on the ship, I mean—everybody except Andrew, John and Margaret. And they've spent their youth here, waiting. Every one of us has built a lot on that moment, the time we land. Whatever happens, whatever it's like, it can't

be up to what we've imagined."

"I get you," said Jo, yawning. "You mean Lærtes Four represents heaven—and it won't be."

"Exactly. We've got to prepare for that, Jo. Any ideas?"

"Talk it over with Margaret."

That was the first and last resort of every morale officer. Margaret had never been morale officer herself, but everyone who held the office consulted her.

"I will. But I don't like going to Margaret and saying 'This is the trouble, what am I to do about it?' I want to get something worked out first so that I can say 'Do you think this will work?'"

"You conscientious people," murmured Jo, already bored again.

"I have a responsibility," said Alan, with all the weight of a man three times his age, "and I'm not going to shirk it. And I'm sorry to see you trying to shirk it, Jo. Very sorry."

"Hell, I'd shirk everything if I could. I can't, though, that's the trouble. There's always people like you prodding me. Look, what can we do, anyway? If everybody has built Lærtes Four into a

sort of paradise, it's bound to fall short of expectation and we can't do a thing about it."

"If everybody worked on that kind of defeatist assumption," said Alan, coldly, "men and women would never achieve anything but death."

"Oh, well," said Jo, unmoved, "the best of luck to you."

"**I** HATE TO SOUND MELODRAMATIC about it, Ben," said Andrew mildly, "but do you realise that every time you do a calculation on a spaceship, people's lives may depend on it?"

They were in the control room, where Andrew lived more or less all the time. And they were alone, or Andrew probably wouldn't have taken Ben to task.

"I'm only checking your figures," Ben said.

"Which means that it doesn't matter. Because I am incapable of making a mistake."

Silently Ben pushed across the first sheet of calculations, the one he had been checking rapidly and indolently enough to incur Andrew's reproof. One line was lightly, casually, underscored in red.

Andrew glanced at it, then looked thoughtfully over it at Ben. "Sorry, Ben," he said. "You know what this means?"

"It means we're off course, but I can't say how much. I should say about a day in free fall and then one-g deceleration again would about put it right."

Andrew worked in silence for ten minutes. "A day is right," he said at last. "Twenty-four hours thirteen minutes, I make it. But the variables make it plus or minus a lot more than thirteen minutes, so we'll make it twenty-four hours. It might as well be now, since we've got a calculation on the present figures. Check."

In the same rapid, casual way, Ben checked. If Ben couldn't do a thing in five minutes, Avril had said once, he couldn't do it at all.

"Right," he said.

"Better warn everybody," Andrew said.

Ben went over to the p.a. and switched on. He gave the tubes time to warm up, and when the "ready" light came on, said: "Control room. Deceleration is being cut for twenty-four hours. Free fall for twenty-four hours. Has everybody got that? Decelera-

tion off in ten minutes. Repeat, ten minutes. Nothing wrong—just a course correction. If you've left any liquid in open glasses, anything fragile unsecured, any books in a neat pile, any drawers open—do something about it, please."

Without switching off or covering the microphone he asked: "Does that cover it, Andrew?"

"I think so."

"All right. Deceleration off for twenty-four hours beginning in ten minutes. Goodbye, all."

He switched off.

"Ben," said Andrew, "you weren't hurt that I appointed Bill captain for the return trip, were you?"

Ben, coming back to the navigation table, checked his stride. "Now how do you know that?" he asked softly.

Andrew shrugged. "I thought you might possibly have been counting on it. There's something that hasn't even been mentioned and yet must be very much in the thoughts of some of us. Unless we go straight back, we'll never see Earth again. It doesn't matter to us older people. Who wants to go back to Earth if he'll be over seventy when he gets there?

But you younger people—you'd only be fifty-five, Ben. Time for a nice, comfortable retirement before you're too old to enjoy it. Was that what you were thinking?"

"That," Ben admitted, "and the fact that I'd sort of got used to the idea. I mean, I'm a useless sort of fellow, not much good to you on Four but quite capable of taking the ship back and making a report. A long time ago it seemed to me that I must have been in line for the job. So I made the best of it. I——"

Andrew shook his head. "No," he said. "It wasn't like that. You're entitled to know a few things, Ben. But mind, I'm speaking in confidence. First, why didn't I tell anyone about this until we were almost on the point of landing? There were several reasons. One, obviously, was that I wanted to wait as long as I could so that I'd choose the right man. Another was that the question was purely academic until we were pretty certain Lærtes Four was going to suit us. Another——"

"Never mind that," Ben interrupted. "I'd have done the same—left it till the last few months. What else?"

"I told Bill why I picked him. We're going to form a colony, and on the man who goes back depends Earth's part in the future of the colony. Now Bill's enthusiastic, and single-minded, and people will follow him. Whatever happens, what he does and says on Earth will get the colony the greatest support, even if it's no longer actually needed. He's the best ambassador. Not the best diplomat, but the best representative of a small, young, struggling colony. He may never come back, but he'll get us help. He *believes* in the whole thing."

Ben nodded. "You're right. Yes, Bill's the man. Thanks for telling me. I'm glad——"

"Wait a minute, I haven't finished. There's still another big reason why it's Bill and not you. The Earth part needs Bill—and the Lærtes part needs you."

"Sugar on the pill?" asked Ben, wryly.

"No. When I die, you're the man to be in charge." He smiled. "Now get used to *that* idea."

Ben was rarely at a loss, but he was now. "Surely . . ." he said, hesitantly.

"Surely there's someone better? No. Not Bill. I've

told you why he's going. I'm glad there's an important job like that for him to do, because I don't want him in the colony. Don't ever tell anyone I said that."

"I won't."

"John? We'll just pass over him silently, shall we? Anyway, I'll probably live as long as he does. Rae? Avril? Both excellent for executive jobs under someone else—not for command. Alan? A man for one job, which he'll do conscientiously, efficiently and contentedly. No, it's you, Ben, you all the time. It always has been. We'll announce it when Bill has gone. I think that would be better."

Ben still stared uncomprehendingly at him. He had never seen himself as a ruler of a colony.

Bill came into the control room as Andrew cut the power and everything on the ship lost its weight. The step that he took over the threshold, an ordinary step, sent him flying into the centre of the room. He twisted easily in the air and let his muscles relax as they could do only in free fall.

"Anything wrong?" he asked. "Or was the announcement as casual as it sounded?"

Ben grinned, his back to-
towards Bill. Bill naturally
wouldn't approve of an an-
nouncement like that.

"Nothing wrong," said An-
drew.

"Good. While I'm here,
I'd like to take up that
matter of who goes with me,
back to Earth."

"I'll make a quick check
round the ship," said Ben.

"Come back as soon as
you can, Ben," said Bill.
"We might want you."

"Okay." Ben pressed gently
against the fixed table with
one foot and sent himself
flying neatly through the
doorway, three feet above the
floor.

"I'd like to take Ben,"
said Bill. "And while he's
away I'd better tell you
why. He's careless and ir-
responsible. Nice guy, but
you're going to have a hard
life and he won't be much
use to you. So if I take him
he'll be useful enough to
me and not much use to you.
What do you think?"

Andrew appeared to con-
sider it carefully. Finally he
said: "You seem to be con-
sidering the good of the whole
project, Bill, as I asked you
to do, and I'm glad. But I'm
sorry to have to turn down
your first suggestion. What

you say about Ben may be
true, but you and he are
almost the same age, the
older young men among us,
if you see what I mean.
Also, next to you he's physi-
cally the strongest among us.
Suppose you take Ben, there'll
be John and me over forty-
five, and then only Alan,
twenty——"

"I understand," said Bill.
"And I may admit I'm quite
pleased about the let-off. I
thought I had to offer to take
Ben as my major assistant,
but . . ." He shrugged.

"How about the composi-
tion of the crew in general?
How many do you think you'll
need, and what ages?"

"Well, the ship runs itself,
as you know. But I think
I'll need a total of four.
More will be born on the
way, of course. I know that's
not necessary, the way it
was on the trip out——"

"No, you're right, Bill.
You're going to be in space
for a quarter of a century
more. You need a girl, and
society, just to remain sane.
You'll need four, anyway."

"I don't believe I'd go in-
sane," said Bill, a little stiffly.
"But someone else might, in
a smaller group. And then,
someone might die. I might.
If I don't have Ben, my first

job will be to train someone who could run the ship if anything happened to me."

"I don't think you need worry unduly about that. Among the things I have for you to take back is a notebook on handling the ship, including all the details about Earth. Even if something happened to you and the girl you take along, a child would be able to learn enough to put the ship in an orbit about Earth . . ."

"Right," said Bill with decision. "If that's settled, then my four are myself, Ellen, Willie and George."

Andrew wished that he had taken the other alternative and simply supplied Bill with a crew, by order. He also wished that Ben would come back. Ben would say quite bluntly the things Andrew himself didn't want to say, and Bill, if he held it against anybody, would hold it against Ben, not his superior.

Andrew had thought—at least, he had hoped—that Bill would select the people Andrew wanted him to take. Andrew was prepared to give way a little, but not to this extent.

He played for time. "Let's have a complete personnel

list, with ages," he suggested, "and then we can see where we stand." He wrote down:

ANDREW—forty-eight.

JOHN —forty-five.

BILL —thirty-four.

BEN —thirty.

Then he added the women, with their children and their fathers:

AVRIL—31—George, 12 (Bill); Bob, 9 (Andrew); Jerry, 7 (Ben); Jim, 1 (Alan).

RAE—27—Willie, 9 (Bill); Jack 7 (John); Dora, 2 (Ben).

MARGARET—43—Alan, 20 (Andrew); Ellen, 17 (John); Joan, 13 (Bill).

(EDITH)—Jo, 21 (John).

JO—21—Reg, 2 (Bill).

As he finished this, Ben, to his relief, came back.

"All's well," said Ben. "I see the girls went back to free fall outfit. Must be variety—they look real cute."

"Never mind that," said Bill, impatiently and rather disgustedly. "We're trying to work out my return crew. I've suggested myself, Ellen, George and Willie."

Ben looked at Andrew, but got no help there. "Why Ellen and not Jo?" he asked.

Bill looked at him as if not certain he had heard aright. "Jo's lazy, casual and incompetent," he said. "Ellens' intelligent and willing. The

girl concerned will have to be able to take over for me. Apart from taking away all the people who wouldn't be of much use to the colony and leaving anyone who is of any value at all, what possible reason could I have for taking Jo instead of Ellen?"

"Jo's in love with you and Ellen hates your guts," said Ben bluntly.

Andrew interposed hastily. "No one is to be forced to go or stay, Bill. I think—I'm almost certain—we'll find that Jo wants to go and Ellen wants to stay. Now this is going to be a permanent split. I mean it's most unlikely that any member of your group will ever see any member of ours again, except the very young ones. And we can't count out emotion. Ellen is John's favourite, you know, and Margaret can't have any more children. They won't want to lose her. And Ellen won't want to lose them. On the other hand, Jo is Edith's daughter, and Edith is dead. John won't mind losing her so much. Then, Jo would want to take her son, and that's all right, because he's yours, too. Don't you see——"

"I still want Ellen," said

Bill, grimly. "If we're going to allow things like this to count, nobody will go at all. Or everybody. But leave that alone for a moment. What's wrong with my taking Willie and George? They're my sons, aren't they?"

"You can probably take one of them," Andrew said. "But both . . . they're the first-born of Rae and Avril. Surely we don't need to tear their eldest sons from both of them."

"Christ," said Bill, in the tone of one who had suffered much, "if you feel like that you'll have to ask for volunteers. On the strict understanding that no one will ever be asked to do anything he doesn't want to do. All right, maybe it is a bit tough to take both Willie and George. I'll settle for one. But I have excellent reasons for wanting to take Ellen——"

"Yes," said Ben, suddenly losing his temper. "One—she's the loveliest girl on the ship. Two—you were Avril's first lover, and Rae's, and Jo's, and you want to be Ellen's as well."

It was impossible for Bill to stay and take that. He could either stay, and hit Ben, or go without a word.

He went, in one savage

lunge that shot him through the doorway and out of sight.

"You shouldn't have said that, Ben," said Andrew, gently. "Even if it's so—there's nothing wrong in Bill wanting to take along a girl he thinks he can love—"

"No, but he needn't be so damned self-righteous about it," said Ben between his teeth, "pretending it's because she's good at mathematics, or could take charge of the ship... and while we're on the subject, is it a secret that Avril and I have been in love for years? But because she and I have already had a child, Alan gave her the last, and John will probably give her the next—"

"Possibly," said Andrew, patiently. "But may I ask, too, if it's a secret that this situation first arose with Margaret and myself?"

"Sorry," said Ben quickly. "I know. I shouldn't have blown up. I can take it, until I see Bill getting all he wants and insisting that nothing matters to him except the good of the expedition . . ."

As Bill flung himself along the passages of the *Hope* he was in a mad rage, and he knew it. He was going to No. 1 storeroom, long since

empty, a black, bare hole where he could stay until he was in control of himself again.

Ben hated him, of course, and had meant to hurt. Ben must be jealous of him, and it was stupid to resent his petty gibe. He would have said anything.

That, however, was only the last, the crowning frustration of a whole series of frustrations. What was the good of asking him whom he wanted when everything he suggested was turned down? Apparently Andrew wanted him to select a crew on the basis of hurting nobody's feelings—as if he were arranging a church bazaar at a village hall back on Earth, and not a journey on which the survival of mankind might depend.

He'd give way on anything else, but he was going to have Ellen. Not for the disgusting reasons Ben had suggested, but because . . .

Ellen herself came out into the passage ahead, and her appearance just as he was thinking of her startled him so that he lost his hold on the brass rail that ran along every corridor for self-propulsion when there was no

gravity, and tumbled awkwardly in the air.

He stared at her, a dozen things racing through his brain. His determination to have her on the return trip. "No one is to be forced to go or stay, Bill." "You want to be Ellen's first lover." And that thing of which Ben was so certain—he had sensed the certainty behind it—"Ellen hates your guts." That had hurt because it carried conviction. Yet what had he ever done to make Ellen hate him?

Through it all he saw Ellen and found her unbearably desirable. There had always been something about Ellen that he couldn't fight, some appealing quality that none of the others had ever had.

Ellen's half-smile at seeing him froze and involuntarily she turned and pushed herself the other way. Perhaps there is an instinct to chase anything which runs away. At any rate, Bill struggled in the air to go after her, and Ellen's withdrawal became flight. He reached the rail at last, and a powerful heave of his arms sent him shooting along the corridor after Ellen.

She looked back, frightened beyond all reason by what she

had seen or thought she had seen in his face, gasped faintly and pulled herself along the rail with frenzied speed. She reached the end of the passage, pushed herself across a cross-corridor space, opened a door and swung herself inside. The door clicked behind her.

Little fool, thought Bill. That was No. 1 storeroom, the very place he had been making for. There was nothing inside but four bare walls, not even a light, and there was no catch on the door. It was the last place she should have gone.

He hesitated for a moment, half inclined to go away quietly and let her palpitate until at last she realised that he wasn't there. *Ellen hates your guts.* He could hear Ben saying it, quite sure of it.

He threw himself across the corridor, flung open the door and tumbled inside.

Ten minutes later Ellen's panting was gradually easing, and after a while it seemed that her heart wasn't going to burst, after all.

Bill was on the other side of the door, waiting. A few moments ago she had listened in the dark and heard his hard breathing. She felt for

the door again and listened to make sure that Bill was still there. Was she supposed to plead with him? Perhaps she was meant to beg him to let her go, and promise not to tell anyone about the incident, and kiss him again, and admit it was all her fault.

She wasn't a prude, and she admitted to herself that what had happened so far was nothing much. If it had been Ben and not Bill—well, if it were Ben outside the door now, there would be humorous bargaining, she offering a quarter of Lærtes Four for safe conduct, he refusing anything less than half.

But you couldn't joke with Bill. And because you couldn't joke with him, you couldn't beg or plead with him.

The door opened again. Bill slipped inside and shut the door behind him.

"Ellen, I'm sorry," said Bill.

Ellen was silent. If you liked someone, you could accept his apologies for anything. If you didn't like him, however, the whole thing was unpleasant. You didn't want him to apologise and you didn't know what to do with his apologies when you got them.

"I'll say anything you like," said Bill. "I knew you didn't want——"

"Never mind," said Ellen. "Leave it at that. I'm going."

"No, wait. I've got to say something."

"And I've got to hear it, is that it? If I try to pass you, is the wrestling match going to start over again? Tell me that, and I'll make up my mind whether to try it or not."

"I won't touch you. But please listen, Ellen. You know I'm to take the ship back to Earth. It's an important job, and——"

"And you want me to go with you. How strongly can I say one word, *No*, so that you'll understand I really mean it?"

"I did want you to go, Ellen," said Bill. "But now that's off."

Ellen didn't interrupt any more.

"This was stupid," Bill went on. "But what I'm asking you is, don't make it into a crime. Consider the whole project. If you make a fuss about this, as you're entitled to do, perhaps the feeling will be that I shouldn't take the ship back to Earth. And that would be wrong, Ellen. I'm the man for that

job; I know it. I wasn't sure at first, but now I believe I must do that, for the good of the whole expedition. I'm begging you, not for my sake, but for the sake of the——"

"You mean, I'm to say nothing?"

"It's a lot to ask of you, Ellen, but——"

"Do you think I'd have said anything, anyway?"

There was a long pause. Since Bill was silent, Ellen said at last: "Get out of the way. I won't say a word. That's a promise." She found the door, opened it, and pulled herself along the passage to her own room.

Bill went back to the control room. Ben and Andrew were still there.

"All right," he said. "I'll take Jo and Reg. The other can be either Willie or George, depending on how it works out."

Ben looked up, interested, and was going to say something. But Andrew checked him with a gesture. "That's fine, Bill," he said.

THE LAST MONTH OR TWO sped by or crawled. Time never seemed to run at its usual speed; either there was something to be done, and

the hours raced, or there was nothing, and it seemed all the clocks on the ship had stopped. With every day being counted, after years when time didn't matter, there were periods when it appeared that the ship was on the very point of landing on Four, with a lot of things that should have been done still undone, and periods when it still seemed an age had to be lived through.

There were many quarrels, and these in a company which had had few quarrels before. Avril was snappish in defence of the children, who sensed the tension and became difficult to keep in check. John mixed himself some witch's brew and became very drunk. Hardly anyone on board had ever seen intoxication, and it frightened them. They thought John had gone mad, and even after he was sober they kept a wary eye on him, expecting him to act in the same way again. Willie and George fought all the time, because George was going with Bill and Willie wasn't. They both loved Bill with a wild, all-embracing hero-worship.

Rae acted like a nymphomaniac, which didn't help matters any. It had been

decided some time ago that none of the women should be pregnant at the time of landing, since they didn't know what physical efforts would be needed. They might have to work like demons, or make a trek half round the planet, or fight for their existence—there were so many possibilities that a few had to stand for all the others. Everybody agreed that having pregnant women around at such a time was taking a chance which didn't need to be taken. Rae knew all that, but driven by some compulsion she acted like a courtesan. It was more than flesh and blood could stand, Ben declared, adding: "That's just an excuse in advance in case my flesh and blood can't stand it."

Margaret was abstracted, sometimes failing to give the advice and comfort which everyone had taken for granted for so long. John was moodier than ever, periodically frightening non-scientists in the party with an interpretation of something they couldn't interpret for themselves that made it seem that living on Lærtes Four wasn't going to be possible after all. Andrew had developed a Lady Macbeth

complex, doing the same thing over and over again, driven by a curious sense of guilt. He was feeling in advance the remorse which would be his if he did make a mistake.

Alan kept asking questions until everybody wanted to scream whenever they saw him. He had found the right line at last, he believed. To guard against overwhelming disappointment when the *Hope* landed on Four, he started a count-your-blessings campaign. The idea was that if people realised how happy they had been on the ship, all in all, there wouldn't be any disappointment. Instead of being the glorious end of an eternity of unpleasantness, the landing was made out to be the beginning of a period of toil and building, a good time, a glorious time, but not nearly as easy and comfortable as the trip on the starship had been.

All the children shared in the general uneasiness. Few of them knew what was wrong, but they knew something was. They became more demanding at the very time when the older people couldn't give them so much attention. Failing to get enough attention, they demanded more.

Bill was the biggest puzzle

of all. He became a hermit. It almost seemed he didn't live on the ship any more. He would be seen for brief periods, and then disappear. There wasn't any mystery about where he disappeared. If you looked for him, you'd find him prowling about the ship, or writing in his room, or checking some installation or other, or lying in one of the empty storerooms, thinking. Only Jo seemed to understand it. "He's taken up his new job already," she explained. "None of this concerns him. He's working out everything that's going to happen from the time he leaves the rest of you on Four."

Jo was different, too, but she was changed for the better. What Bill and Andrew had said to her the others didn't know, but from the time it was known that she was going back to Earth with Bill she took more interest in things, seemed happy, and made a belated attempt to learn in a few weeks all the things she had refused to pay any attention to all her life. If her enthusiasm lasted, she would be a very useful second-in-command for Bill. Jo wasn't pretty, and she had no talents that anyone knew

about. She wasn't even clever, either, like Ben or Ellen, who seemed to know things without being told, or Bill or Alan, who made it their business to find out everything they might need to know, and how to apply it. However, she knew her own limitations, and that made up for a lot.

Only Ellen and Ben were unaffected. Ben postponed quarrels, carrying around a little book in which he noted subjects for future argument. "We'll take that up again in about six months' time," he would say. And Ellen was her usual sunny, attractive, obliging self. If anyone noticed how Bill kept out of her way, no one remarked on it.

"It's too good to be true," said John.

In the control room for a final conference were Andrew, John, Margaret, Rae, Ben and Ellen. Bill was concerned, too; he should have been there, but they hadn't been able to find him. Avril was with the children and Alan was in bed with a sprained ankle.

Ben grinned. "For you, anything that's good is too good to be true," he said. "You in your normal state

and Alan in his count-your-blessings role would just make one normal person."

"Even an optimist," Andrew said, "wouldn't exactly have counted on this."

They were considering the specifications of Lærtes Four. as John had worked them out through the years. Distance still remained the greatest difficulty in astronomical prediction, and since by this time the *Hope* was actually within the Lærtes system, that difficulty was all but gone. There were six planets, though only the fourth and fifth were of immediate interest to the expedition and to mankind. The first was a cinder, even more burned-out than Mercury; the second a steamy dust-bowl like Venus; the third obviously a captured world, a huge lump of dead rock with no internal heat and a very eccentric orbit; the sixth, a tiny, frozen world far out which had not been allowed for in the calculations back on Earth.

The fifth world would support human life. There were drawbacks, though. It was about the size of Mars and almost as dry. Unlike Mars, it had plenty of oxygen—too much, and John had suggested that instead of adapting to

the comparatively thick air of the surface, which human beings could probably do, it would be preferable to adapt to the thin, but oxygen-rich, air higher up. This would mean living in the mountains at first—Five had many high plateaux—and later, perhaps, building vast platforms hundreds of feet up.

But Five, which in other circumstances would have been hailed with joy, played second fiddle to Four. Astronomers had postulated, no more, that Lærtes Four should be an Earth-type planet. They could be sure of very little from their observatories many light-years away, except that it was an oxygen-carbon world approximately the size of Earth and of about the same surface temperature.

However, every fresh fact that John had found out on the way made Four more desirable. Gravity was .94. The air was virtually the same as Earth's. There was a little more land surface—just over a third. Mean temperature was slightly higher. The only major difference was that Four had no seasons. It had an almost perfect orbit and no tilt. Its climate, almost everywhere, should be more temperate. Though Four had

almost as much sea as Earth, the land-sea distribution was more even. Four had no seas as big as the Pacific or Atlantic, many lakes bigger than the biggest on Earth, no continents as big as Asia, many near-islands connected up by narrow strips of land. A map of Four looked rather like wire-netting, though much more irregular. There were thousands of big and small pockets of sea enclosed by narrow lines of land.

The strips of land were thin only relatively. Few were thinner than fifty miles across. On the other hand, in only one small area of twenty square miles or so could one claim one was as much as two hundred miles from sea or a large lake. It was a world on which, at first, anyway, cargo-carrying would probably be by sea, in some region where there were sea passages over a wide area, later by land as civilisation spread and the land-locked seas began to check expansion, and finally by air, when neither by land nor sea was anything like a direct passage possible.

"There are only two things that might prevent Four being a perfect world for humans," said John. "One, bacteria we

can't cope with—which I find almost incredible. Two, an intelligent and inimical race in occupation—which is hardly more credible."

"Why?" asked Rae, who unlike most of the others didn't know a great deal about John's work and was hearing quite a lot for the first time.

"Four is a young world," John said, "much younger than Earth. Put it this way—Four has been in its present state, perfect for us, for only about one-seventh as long as Earth has. Probably less. Now, while it's possible that some species of life has evolved to our level in less than one-seventh the time, it seems——"

Rae nodded. "I see. Only is there any reason why Four shouldn't be in the mammoth stage, swarming with dinosaurs and pterodactyls?"

"None," said John. "But we can handle dinosaurs and pterodactyls. Mere size and strength won't bother us. All that we really have to fear in the local inhabitants is high intelligence. And while we have only our own System as a basis for guesswork, I don't think there's been time here for high intelligence to evolve."

"Well, I don't see what Alan has to worry about," said Ben in a matter-of-fact tone. "Unless you're all wrong, John, Four *is* heaven. We needn't prepare for disappointments, for there aren't going to be any."

John frowned. As a scientist, he had had to say what he believed to be true. Nevertheless, as a man it pained him to see people being so optimistic. Into his calculations was always built the ineradicable conclusion that things could never be as good as they seemed. However, he said nothing, because as a scientist he couldn't see where the drawback was.

The landing course, calculated about three hundred times by Andrew, twenty times by Ben, and two or three times by everyone who had the maths to do it, turned out to be correct, rather to John's surprise. Day after day Andrew checked to see what new corrections were necessary, and rarely found anything significant enough to warrant interfering with the present course and rate of deceleration.

The last days sped past. And with Four the biggest thing in the sky, a green and

blue world very like Earth except for the different markings on its surface, Alan, his ankle recovered, went round making his last effort.

He left out Andrew, John and Margaret, for they knew at first hand what living on a planet was like and he didn't. If they were going to look back to their youth on Earth through rose-coloured spectacles, there was nothing he could do to stop them, he reasoned. Ben, too, he omitted. Ben had always been Alan's hero. Though aware of possible bias, Alan concluded that if Ben wasn't emotionally stable no one else on the ship was.

So he started with Avril.

"Go and peddle your count-your-blessings campaign somewhere else," Avril told him. "I'm too busy. And I expect I'm going to be too busy when we land to know what I think anyway, so you needn't worry about me."

"Just so long as you know the dangers——" began Alan pacifically.

"I know them. I don't think there's much risk of my believing I'm going to heaven before I die, if then. Lærtes Four is going to mean exactly the same to me as this ship—kids, kids, kids,

not only my own but everyone else's, too. Don't think I'm complaining. I love it." And she smacked Dora's fingers as the child tried to pull free an insulated double wire stapled to the wall.

Bill merely stared at him as if he were talking Cantonese.

"What's it to me?" he asked. "I'm not going to live on Four."

"But——"

"I know. I may think it's going to be glorious living there and fret when I have to go away in the ship. Listen, Alan, you're doing your job and that's fine; I'm glad of it. If anyone has a mental breakdown because things are different on land than in space, it isn't going to be me. Got that?"

Rae was awkward. She draped herself around her cabin in all the most seductive poses she could think of, persisted in talking like the heroine of a French romance, and generally acted in a way that would have brought a severe reproof even from the mild Andrew if he had seen it.

Alan would have liked to tell her to behave herself, the way Ben did, but he doubted his ability to carry it off as Ben would have done. Rae, after all, was seven years

older than himself, and she used her advantage in experience to the limit. All he could do was be twice as pompous as usual, and when he couldn't shut his eyes, be careful not to look too long or too closely at Rae.

That interview, he felt, was not a success.

It was a pleasant change to talk to Ellen. She told him sunnily: "I'm sorry, Alan, but I just can't be gloomy about Four. You see, for me it's going to be wonderful. I can't help that. It's the way I'm made. I never see what anybody else is grumbling about. I expect that makes me queer. Soon after we land, some of us will find something to grumble about, and I'll grumble, too, just to be sociable, but I won't really see what the fuss is about. For me, Four *is* going to be heaven, and you can't make me believe it isn't."

Jo merely said: "I'm going to have Bill, that's all that matters. I won't even notice that we've landed."

Alan was moderately satisfied with his round.

Almost everyone underestimated Alan, but it didn't bother him. They underestimated him because he

never looked competent, and never seemed to be going the right way about whatever he was doing. What a lot of people missed was the important fact that Alan almost invariably got results. Pompous he might be, and over-conscientious, and self-important. But he was also highly intelligent, and behind his officiousness was a blend of the shrewdness of Andrew and Margaret, his parents.

John had indicated the obvious landing place. It wasn't really essential that the ship should be set down exactly at the spot where the colony was likely to be based. However, the map showed that a certain location in the southern hemisphere was so beautifully situated for development that it was the natural region to examine first. Land and sea communications looked excellent; the climate was next to perfect for human health; it was the place which for centuries, perhaps, might be the headquarters of government on Four.

Nobody on the *Hope* was calm as it dropped rapidly but gently and markings became land and sea and the eternal black sky of space gradually took on a tint of

blue. Ben and Andrew were most successful in pretending to be calm, but it was only pretence.

Back on Earth, Andrew remembered, people were thankful, relieved, even joyful when a journey of only a few days or a few weeks came to an end. What conception could they have of the feelings of people who were just finishing a journey of twenty-three years? Later there would be nostalgia, as happy times on the long trip were remembered. But now there was only a wild feeling of gladness that it was all over.

Except for Bill and Jo, for whom it wasn't over. Bill had his arm round Jo's shoulder, a rare sight. In public, emotion didn't exist for Bill. One didn't make a display of emotion any more than of urination or excretion. It might be inferred that Bill felt about emotion as he did about urination and excretion—necessary, undoubtedly necessary, but who made an exhibition of them?

The ship was dropping towards a sea of white cloud. The people on the ship had heard about clouds, and seen pictures of them, but the clouds they had heard of had always been considered from

beneath. They had never thought of clouds as seen from above.

There was no talk, that was the strange thing. Some didn't talk because they were afraid that anything they said would sound silly. Some were afraid they wouldn't be able to control their voices. Some simply had nothing to say.

This was the moment they had all lived for for so long. Whatever Lærtes had to offer, it was all they were going to get—there was no question of going to any other star if Lærtes didn't have a suitable planet. The nearest star was seven light-years away and could not possibly have an Earth-type planet, anyway.

John was the most worried of them all. He probably would have been in any case; but in addition to all the other worries, he had the responsibility of having told everyone what to expect. He had said Four was habitable, and that there wasn't an intelligent race already inhabiting it. And John was the sort of man who would get little satisfaction from being right, but a lot of dissatisfaction from being wrong.

The ship dipped through a bank of cloud and came out

abruptly above the surface of Four, with nothing to obscure the view of the people on the *Hope*.

Stretching out below was a vast city.

There was a moment of stark disbelief. People can believe at a moment's notice only the things they are half-way prepared to believe.

The city was clean and white, nicely planned. Most of the blocks were rectangles, but here and there a broad boulevard cut across the robot precision of right-angles and squares, sweeping diagonally or in a wide arc and saving the city from rigid symmetry. There were big green patches, too, and little lines of green specks which spoke of tree-lined avenues. No river ran through the town, but there was a large pond near the centre, obviously artificial from its regular shape. One corner touched one lake; another was bounded by an entirely different lake which had three thousand miles of coastline.

"It's an Earth city!" Ben breathed. "That means . . ."

They all knew what it meant.

TO BE CONTINUED

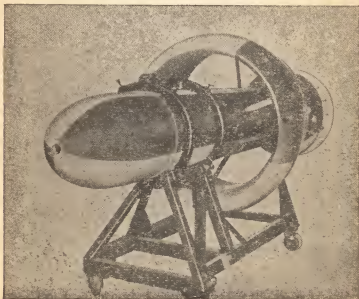
THE GUIDED BOMB

by Kenneth W. Gatland, F.R.A.S.

THE ADVENT OF RADICAL HIGH-performance bombers raises many tactical and operational problems, not the least of which is the ability of the bomb-aimer to strike at his target with precision. Bombing from a platform travelling at a speed close to that of sound, at a height of twelve miles, would be a tricky affair despite the use of highly developed radar detecting and aiming equipment; the release would have to be made from a point several miles outside the target centre. Clearly, there was little merit in having the best possible bombing platform while still retaining the old-fashioned free-falling bomb.

The obvious solution was to guide the bomb, and preliminary studies having been carried out at the Ministry of Supply's experimental establishments, the project was handed over to industry to produce the first prototypes—these weapons senior officers in the R.A.F. have declared to be "the biggest forward step in military air power."

How will the guided bomb operate? There are a number of possibilities. The simplest method follows the practice of the free-falling bomb but with directional control exercised from the bomber over the final path of the trajectory. It will still be essential to release the bomb accurately in conjunction with radar sighting equipment.

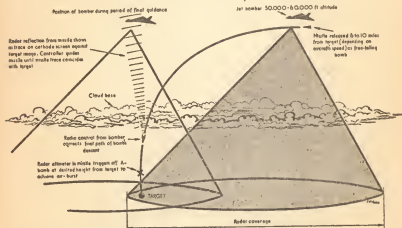


American bomb which has a television "eye" in its nose and is controlled from mother plane

A guided bomb of this type need have no inherent propulsion unit. It will leave the bomber in the normal way and, as it falls towards the target, will show up on the radar screen as a trace against the image of the target area. The task of the bomb aimer will then be to guide the weapon by remote radio control until the bomb-trace coincides with the image of the target. In this he may be assisted by signals transmitted from the bomb itself, which will feed data on the weapon's relative motion,

mediately reduce the picture to black and white spots.

Television guidance has been tried experimentally with the American ROC controlled bomb, with results that astonished service chiefs. The TV-eye is fitted in the nose of the ROC and the radio impulses controlling the bomb's trajectory are relayed to servo-motors which actuate a tail steering ring. An annular aerofoil surrounding the bomb amidships serves the function of wings. It must be borne in mind, however, that there



height, etc., into a computer to permit accurate corrective signals to be given.

A refinement of this technique would be to provide the missile with a "television eye." This would place the bomb aimer (or should we now call him the "bomb controller"?) in the position of a pilot seeing the approaching target from inside the missile itself. Clearly, this would greatly facilitate control of the bomb, but anyone who owns a television set will appreciate how easily the device could be interfered with. It would, in fact, be a simple matter for any enemy to set up jamming stations in the vicinity of potential targets which would im-

mediately reduce the picture to black and white spots.

is a whole world of difference between demonstrations carried out under perfect test conditions and the use of such weapons operationally when the enemy is employing every conceivable electronic device to confuse the signals which give the missile its directional intelligence.

When a number of pilotless Hellcat dive-bombers, fitted with radio-control and guided to destruction, struck at Communist targets in Korea, some were fitted with "television eyes." They were successful because the enemy was taken by surprise, but it is doubtful if the advantage would remain in the hands of the attacker for

long in a full-scale war against a prepared enemy. The perfection of reliable guide-control devices which give protection against interference is beset with fundamental difficulties, and as we enter the "electronics age" in weapon development, this factor assumes increasing significance. The comparative ease with which normal broadcast transmissions can be jammed is a measure of the difficulties, and if these can be blotted out, so can the radio-control signals emanating from a bomber.

Key industrial centres can be ringed with powerful jamming stations which will far outrange the output of guidance equipment carried in the bomber. Ships, too, can be packed with equipment for the express purpose of distorting the radio and radar homing signals into a meaningless jumble of messages which will utterly paralyse the "electronic brain." Only surface-to-air and air-to-air missiles can operate on anything like equal terms with their adversary, since there is an obvious limit to the amount of jamming equipment that can be carried by an aircraft.

Electronically, the bomb designer has by far the most difficult task, and for this reason the initial effort may lie in the direction of the "elementary guided bomb"; it has the advantage that even should control be completely destroyed, the bomb will still be close enough to the target to cause extensive damage.

An elementary device designed to overcome interference is the "radio-lock." This depends on the transmission of several command signals simultaneously on different frequency bands, each frequency being picked up by the same number of miniature receivers in the missile. Only by opening all the channels and holding them open will the missile respond to the command signal. Thus, the enemy might be able to open all the channels in turn by ranging through the radio spectrum but will have no ready way

of knowing the correct combination of frequencies for that particular missile.

It is possible to devise systems which involve synchronized switching of frequencies between bomber and missile. In fact, there appears to be no limit to the number of tricks the electronics engineer can employ—but he must always be several points smarter than his opposite number in the "enemy camp" whose only purpose in life will be to shatter his illusions. Secrecy and frequent change of the control method may be factors of paramount importance.

It is, of course, not only radio and radar devices that can be employed for weapon control. The Germans, in particular, thought a good deal of systems that were responsive to infrared radiation and considered that missiles could be designed to seek out sources of heat—heat-discharging factories, ships, aircraft, etc. This line of development is known to have been continued in the United States.

The attack need not, of course, always be made from high level. A winged missile, rocket-powered to provide greater range and to minimise the risk of interception, could be carried by a high-speed low-altitude bomber. The bomb would have the form of a slender missile with a pointed nose to suit the supersonic requirement, and wings would be embodied to enable it to approach the target in a high-speed glide. In the case of the winged bomb, release at the correct height, speed and range, and accurate course setting in conjunction with radar, might be the only requirements for the bomb to navigate itself to the target. It would employ the "dead-reckoning" system in which a frame of references is defined in inertial space by gyroscopes and the motion of the missile is followed by integrating accelerometers. These accelerometers measure accelerations in a horizontal plane and integration of the results will provide a knowledge of the missile's motion over the ground. Any deviation



Bell X-1 carrying a B-66 Rascal guided bomb

from course will be corrected by servo-mechanisms acting on the control surfaces.

To achieve this accurately will depend upon releasing the missile above a point on the ground which has a known relationship with the target; this may be verified by the bomb aimer and navigator in conjunction with additional reference points. In the case of a nuclear weapon, an airburst could be achieved by a radio-altimeter or by a timing device based on the navigational system.

The advantages of the "dead-reckoning," or inertial, control system is that the bomb, once released, is completely on its own and cannot be interfered with by electronic or any other means short of its complete destruction by shells or missiles.

Further, the bomber no longer makes a "run" over the target and can turn away immediately the bomb has been despatched. On the other hand, the missile will be easier to destroy by radar-controlled "ack-ack" fire or counter-launched missiles than

a bomb which descends vertically on its target.

One of the first examples of a powered guided bomb is the B-63 Rascal, which Bell Aircraft Corporation have developed from experience gained with their series of supersonic research aircraft. The new missile is designed to be carried partially within the bomb bay of long range bombers, the launching gear being similar to that of the B-29 Superfortress used for air-launching the famous Bell X-1.

To ensure that the bomber remains outside the perimeter of the main concentration of the enemy's defensive missiles, Rascal is likely to be released at an altitude of between 40,000 and 50,000 ft. at a point at least 100 miles from the target. It drops away in a level attitude with power off. Initial direction is pre-set by the bomber's navigational system and maintained in flight by the missile's own auto-pilot. Immediately after release, the rocket motor is started and, following a

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There were surprises in store when they set out to do what appeared to be a simple—

Repair Job

by JULIAN CAREY

IT WAS NOT A BAD WORLD as worlds go. It had a blue sky and something green which could have been grass but wasn't. It had air and water and a fairly high temperature. Obviously it must have been visited before and equally obviously it had proved to be quite valueless from the human standpoint, for it was totally unspoiled.

Belcher kicked absently at the green, moss-like vegetation underfoot, sniffed at unfamiliar scents, and called to his partner.

"Come on, Fenson. The quicker we get working the sooner we'll be away."

"Coming." Fenson, short and plump against his partner's leanness and height, jumped down from the open air lock. Like Belcher he had an energy pistol belted around his waist and, as he landed, stared over the monotonous green plain on which they had landed.

"Going to run the geigers over it?"

"There's nothing valuable here." Belcher kicked again at the ground. "This isn't an undiscovered world; it couldn't be, so near the star lanes, and we'd be wasting our time to prospect for heavy metals. Let's get the ship repaired and be on our way."

Fenson nodded, and breaking out a kit of tools, began to unbolt the housing of the air conditioner. Failure of that essential piece of equipment had forced them to emerge from hyper-drive and to make an emergency landing on the first habitable world. Now, with the instinct of spacemen, their first thought was to get their ship ready for space again.

The housing removed, both men stared at the convoluted coils of the air conditioner. Its operation was simple. Air from the ship was passed through the chilled pipes, the

carbon dioxide frozen out, and the oxygen returned to the living quarters. Somehow it had sprung a leak so that, instead of a constant return of usable gas, they had consistently lost air. With the low stores of oxygen carried in the emergency tanks they had either to repair it or finish their journey wearing space suits. Neither of them liked the thought of spending several weeks in suits.

"Grab a wrench and let's get to work," ordered Belcher, the engineer of the two. "Uncouple the pipes, and when you've done that, start loosening the holding bolts." Metal clanged as he set to work.

Fenson swore as his wrench slipped and caused him to skin his knuckles on a sharp edge. Irritably he sucked at the injury, glowering at the assembly which, apparently, had never been designed to be removed by anything short of a squad of engineers backed with the equipment of a workshop.

It was growing dark by the time they had finished and both men were irritable from the heat and the stubbornness of bolts which had to be located by touch rather than sight. Fenson swore as he

threw his wrench down beside the removed assembly and tried to rub the ache out of his back.

"I've had enough. Let's eat and turn in."

"Good idea." Belcher wiped his palms against the sides of his legs and stared over the darkening plain. "Think it's safe to leave this stuff out here?"

"Who's going to steal it?" Fenson headed towards the air lock. "It'll be dark before we can dismantle it and we haven't rigged lights. Anyway, it'll take up too much room inside."

Belcher hesitated, looking at the mass of pipes and discarded tools. "I'd thought of stripping it down tonight, but maybe you're right. We can work just as fast if we make an early start tomorrow." He smiled as he followed his partner into the ship. "Eager to get working on that jig-saw of yours?"

"I swore I'd finish it before planetfall." Fenson switched on the electric stove and filled a coffee pot from a faucet. Quickly he set the table with tins and boxes of food, then, the meal prepared, he sat down before a mass of intricately shaped pieces of

metal. Theoretically they could be fitted together to form a smooth, featureless sphere. The trick was to find out which piece went where.

"You'll be grey before you finish that," Belcher sniffed at the heating coffee. "What made you buy such a thing?"

"It's a challenge to my mechanical skill," Fenson reached for something which looked like a distorted peanut. "A man designed it and what a man has done, a man can do."

"Some men," said Belcher, unkindly. He took the distorted peanut, removed a piece from the partially completed sphere, clicked home the peanut and replaced the removed portion. "It isn't just a matter of putting them together," he said. "It's assembling them in the correct order. You've got to have a knack for it."

The boiling of the coffee drowned Fenson's answer.

The next day they were out at dawn and by the time the sun had reached the zenith, Belcher had stripped the tubes.

"May as well do the job properly now we've started," he said to Fenson. He pointed towards a multiple junction.

"See that distortion? The entire joint could have blown after a few more temperature changes. We'll give it a good clean, and by the time we've reassembled it, it will be as good as new." He bent over the unit, happy with the happiness of a man to whom machinery is a constant source of delight.

Fenson didn't feel the same way about it. Left to himself he would have done the minimum necessary to get the unit working again. Now he sweated in the increasing heat as he scraped and polished, cursing as the metal chafed his tender skin.

"What's the matter?" Belcher looked up at Fenson's grumbling.

"Lost the damn scourer." Fenson put down the tube he was cleaning and stared around him. "Funny. I had it a minute ago."

"Maybe you're sitting on it?"

"No." The plump man heaved his bulk off the ground and looked around him. "It's gone."

"Get another one from the tool kit."

"All right." Fenson walked over to the kit, found another scouring brush, returned to his position on the "grass"

and finished cleaning the tube. He placed it to one side, picked up another, dropped the scourer and reached for the reamer.

He picked up a scouring brush.

He stared at it, then at the one he had fetched from the tool kit, then, with mounting irritation, stared around him.

"What's the matter now?" Belcher stretched as he stepped from the side of the ship. "Something wrong?"

"I've lost the reamer."

"You said that you'd lost the brush."

"I've found the brush. Now I've lost the reamer." Fenson stared at the two brushes in his hand. "I don't get this. First I lose a brush, then I get another brush, then find the one I lost and lose the reamer instead."

"You're crazy." Belcher stared down at the ground, circled, picked something up and looked at his partner. "Here's the reamer. You must have dropped it when you went over to the tool kit."

"I didn't drop it. I didn't have it to drop. I put it down before I even moved."

"How did it get over here, then?" Belcher shook his head. "Take care of these

tools, Fenson; we can't get replacements here."

"I . . ." Fenson scowled as he took the reamer. "I'm almost certain that I didn't drop it."

Belcher shrugged and looked at the pile of cleaned tubes. He waited until Fenson had finished the one he held, then began to sort them for reassembly. He paused and looked at Fenson.

"Where's the multiple?"

"With the rest." The plump man turned just as he was about to enter the ship. "It was one of the first things I cleaned."

"Where is it then?"

"On the ground with the rest of the tubes." Fenson cursed as he saw the expression on the engineer's face. "What's the matter with you, Belcher? Blind?"

"I can see everything else," said Belcher, coldly. He stared at the heap of tubes. "Maybe you'd better come and help me find it."

They searched the immediate area. They searched the ship, the other side of the vessel, the gaping hole in the side where the unit usually rested, and then, for no logical reason, searched for a full hundred yards in all

directions. They didn't find the multiple junction.

"This is crazy!" exploded Belcher when they had returned to the ship. "It *must* be around here somewhere."

George didn't answer. He rested his back against the warm metal of the hull and stared dully over the green plain stretching about the ship and vanishing over the horizon.

"It couldn't have walked," said Belcher, speaking more to himself than the other man. "It couldn't have been stolen. It couldn't have been mislaid." He slammed the fist of one hand into the palm of the other. "Damn it! If it couldn't have done those things then it must still be here."

"Logical," said Fenson, emotionlessly. "And without it we can't finish the assembly." He shivered. "This place is beginning to give me the creeps. This is the second—no, third—thing which has vanished since we landed."

"Third?"

"The brush—that turned up after I'd looked all over for it. The reamer—you said that I'd dropped it and I knew all the time I hadn't. Now the multiple." He hesitated. "The other two things turned up

again," he said, slowly. "I wonder . . ."

Belcher led the rush towards the heap of tubes, but it was Fenson who saw it first. Not the multiple, but a round and naked skull.

A human skull.

"Aliens," said Belcher, and swore with concentrated bitterness as he stared at the mocking grin engraved on the white bone. It was night and the two men huddled in the cramped living cabin, the lights full on and the doors fast-sealed. Fenson shuddered as he stared at what they had found.

"It all adds up," continued Belcher. "I've tested the skull for age and radioactivity. It's radioactive, but not dangerously so; about what we could expect had it been in a force field, and it hasn't been here long." He swallowed. "My guess is ten years."

"Need he have died here?" Fenson sounded desperately hopeful. "Some ship could have landed and buried him."

"Just his head?" Belcher scowled at his partner. "No. Anyway that thing was never in sight when we landed. Someone or something took the multiple and left the skull in exchange. I call them

aliens because that, to us, is what they are. But to them, of course, we're the aliens."

"I didn't see anything." Fenson toyed with a piece from his jig-saw. "I was watching all the time and I'd have seen anything move."

"If you could see them at all." Belcher shifted restlessly on his seat. "They don't have to be like we are, remember. Perhaps they're vibrating at a different rate than us, or maybe they're just entities of pure force, or invisible in some way. That doesn't matter." He touched the skull. "I don't know if this was left as a warning or not, but one thing I'm sure of. The quicker we get away from here the better."

"Without the multiple?" Fenson looked hopeful. "Can we?"

"We could seal the hull, I suppose," said Belcher. "But we'd still have to wear the suits until we could make planetfall. We could do it if we had to, but it wouldn't be nice."

"What else can we do?" Fenson flung down the piece of metal and faced his partner. "The multiple has gone. We can't repair the air-conditioner without it and we're surrounded by some

form of life which threatens our own. I . . ."

"No," said Belcher. "I think that you're wrong. I don't think that the aliens really wish us harm. They might be warning us, or then again they might just be curious. If extra-terrestrial life landed in a field on Earth wouldn't we have been curious? We'd have watched them, picked up some of their tools, perhaps, and, if we'd had a rigid code of ethics, we would have replaced them with something of our own." He touched the skull. "My guess is that this poor devil starved to death. Maybe he landed for the same reason we did, or perhaps he thought the planet valuable. Whatever the reason, he stayed too long. I don't think that the aliens consciously killed him."

"Why not?"

"We're still alive, aren't we? We've worked outside for almost two days now; plenty of time for them to have killed us if they'd wanted to. Instead of that they've just annoyed us. If it wasn't for the multiple we could take off now." Belcher's eyes grew thoughtful. "Maybe they're bored. This planet is a monotonous place with its flat

green plains and patches of water. Maybe they're having a little fun at our expense."

"Nice fun," said Fenson, grimly. He looked at the skull. "I bet that this fellow laughed himself to death."

"If I'm right and the aliens are bored, then that would account for it. They would have amused themselves with him and then, after a while, forgotten him." He stared at the skull. "I wonder what they did to him?"

"What does that matter? Unless we get the multiple back we're going to have to live in our own stink for the next few weeks. Even that would be better than dying here."

"Perhaps not. What if we did take off—and some of them came with us? We couldn't see them. We might never know they were aboard. Think of the damage they could do in a habitable world. Parts mislaid, tools, jewellery, all manner of things—and innocent people getting the blame all the time."

"To hell with that. How about us?"

"We'll repair the ship as far as we can," said Belcher, slowly. "I've an idea which may work. If it does we can finish the job and head into

space. If not we'll take off tomorrow night." He grinned at Fenson. "You'd better start praying that my theory is right. If not . . ." He looked at the skull.

The air was sweet and pure, circulating as it should through a conditioning unit which worked with smooth perfection. Fenson took a deep breath as the normal, starshot night of space swirled with the oddly disturbing colour shift of hyper-drive, then smiled at Belcher.

"That was a good idea of yours," he admitted. "But you couldn't have done it without me."

"You can have all the credit and the blame—if any." Belcher relaxed as he listened to the soft purr from the repaired air conditioner. "We'll never really know whether my theory was right or not. I took a lot for granted, but it seemed to work. At least, we got the multiple back all right."

"It cost enough," grumbled Fenson. "All that stuff . . ."

"Nothing we couldn't spare. Your jig-saw did the trick, though."

"I know." Fenson sighed as he remembered his loss.

"Maybe I can buy another one at the next spaceport?"

"Probably." Belcher stretched with the satisfaction of a man who has been proved right. "I gambled that their interest in what we were doing would prompt them to exchange the multiple for the three-dimensional jig-saw." He grinned as he remembered how he and Fenson had sat beneath the ship wholly engrossed in the game. They had left their tools, the skull, a mass of other supplies, scattered about and had watched them vanish one by one to be replaced with either different pieces of equipment or local rubbish. Not until their nerves had reached the breaking point had they walked away from the game—only to turn and find it gone, with the multiple junction in its place. An hour's work had seen the repair completed and the ship blasting up through the atmosphere.

He sat up as he saw Fenson's curious actions. "What's the matter?"

"I seem to have lost my handkerchief," muttered the plump man. "I could have sworn that I had it. I put it down and . . ."

Both men stared at each other in horrified surmise.

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HEALTH AND MEDICINE IN THE FUTURE*

DURING THE NEXT FEW decades there will be many notable advances in medicine and we may expect to see new diseases discovered and others added to the already long list of ills for which a cure can be "guaranteed" or immunity secured. But it will be surprising if, on the whole, the illness ratio is reduced during the next ten or twenty years.

Sympathy with the sick is, in terms of human history, partly a new idea; a gigantic health service, absorbing a considerable part of the national effort, is its logical development. The feelings involved are so obviously right by civilised standards that no one has questioned the

desirability of providing for every person the best possible treatment, regardless of cost. No one, however, has paused to consider what is happening. If we plot graphs representing the cost per patient, the number of hospital beds per 1,000 people, the number of doctors, nurses or any other expenditure on health services, against the passing of the years, we find that the line in each case is accelerating rapidly towards infinity. The number of doctors has doubled in a comparatively short period, the expenditure per patient has trebled and the number of laboratory tests has been more than quadrupled. None of the increases shows signs of evening to

* From *"It's Bound to Happen"* by A. M. Low (Burke).

steadiness. We are told we need a minimum of another 15,000 doctors. Every year new laboratory tests are invented which undoubtedly improve the chances of accurate diagnosis.

All these indications show that producing the curve of the graph is justified and that by about A.D. 2,000 half the nation will be engaged in providing medical services for the other half. This is, of course, absurd, for it is obvious that the whole economy of the nation would break down.

Let us look at some of the discoveries that are certain in the comparatively near future. Extensive research upon substances derived from moulds suggests that during the next few years a number will be found to attack disease-causing organisms which are immune from attack by penicillin, the first of the moulds to be used in this way. One of the new types is streptomycin and it is being increasingly used. All of them, no doubt, will have certain disadvantages, but within thirty years we may expect to have materials which will destroy the organisms responsible for whooping cough, infantile paralysis and

many other infectious diseases at present beyond our control. This advance will save millions of lives, but may well be accompanied by the appearance of new diseases, or of old diseases in new forms. Already medicine has discovered "penicillin-resisting" strains of organisms of the type which ought to be destroyed but which, in fact, are immune.

Doctors can provide treatment for almost every condition. The symptoms and the condition may disappear and that, as far as the doctor is concerned, is the end of the matter. But is it always the end? Is it not possible that the treatment for one disease has made the patient more susceptible to a host of others? Shall we discover that the real cause of the endless coughs, colds, rheumatics and other minor aches and pains which now seem to afflict the public lies in the very "cures" we have discovered for other ailments? That is one leading argument of the "Nature" healers, and orthodox medicine may in the not distant future give some attention to such a point of view and react against the specialisation which has become greater in recent years.

The organs of our body have been so far separated on paper that one man treats the heart, another the liver and yet another the brain. Human beings function as a whole, and one mild danger of specialisation is that the specialist tends to look at all symptoms in terms of his own pre-conceived opinion.

The tendency will be for the patient to pass before a series of doctors, rather as in an army examination, each of whom will examine him for some detail and then pass him on to the next booth. At the end of the assembly line he will have been thoroughly assessed and the "foreman" will merely have to glance at his card to see the treatment required.

Now, obviously, there cannot be enough doctors, pathologists, and laboratory workers to apply all these tests to every sick person. But it would not be hard to devise an electronic machine which would do it in a matter of seconds. The apparatus would be no more complicated than electronic calculators already in use in industry. The record of the heart beats, the X-ray of the chest, the blood count, the urine test, the "brain wave"

record would be pushed out like lightning, or like fortune-telling slips from automatic machines. It would be simple in principle to arrange for a final diagnostic section to scan the records, consider all the possibilities in the form of an electrical integrator machine, and then record the diagnosis. A further few hundred valves and circuits would enable the treatment to be prescribed and handed to the patient.

This is the nightmare of a visit to a doctor's surgery half a century hence. There is no queue, because the electronic doctor is dealing with patients at the rate of one every minute, far more accurately than any qualified human. We pass in front of what resembles an elaborate radar set. Temperature, appearance of the tongue, degree of pain, blood pressure, all the innumerable symptoms that it would take a doctor hours to discover are recorded in a matter of seconds. A card is shot cut and we read: "Take the mixture three times a day after meals. You need more fresh air and exercise."

This is a dream, unlikely to become reality even if only because doctors have the

most powerful trade union in the world and would never allow themselves to be replaced by machines. But it is not impossible and may well arise as the result of specialisation or an increasing dependence upon electrical, chemical and other tests.

In the near future we shall come to a much greater understanding of the brain in action, as distinct from the brain in the dissecting room. We shall be helped by delicate recorders of small electrical charges, developed as a result of discovery and invention in radio. Although the current variations recorded on the electro-encephalograph are called "brain waves" because they have a wave formation, they have, in fact, nothing to do with definite thought as far as we know today. The use of this device is still new, and the very difficult task of interpreting the changes that occur in the brain under various conditions is still in its infancy. Quite apart from an understanding of the phenomena of sleep and the better diagnosis or location of tumours, the "E.E.G." in new forms is likely to give us much more understanding of mental processes in general.

Indications seem to show

that civilisation and industrialisation impose additional stresses on men and women, adding to the risk of mental illness, just as their congregation in towns increases the risk of infectious disease. In the near future we shall adopt methods of "hygiene" for the mind as we have adopted public hygiene for reducing the onset of disease which is due to bad drainage or bad drinking water. The task is much more difficult because everyone resents restraint of mental freedom even more than a ban upon their physical ability to do as they please.

The most spectacular advances in the next decade are likely to be in the realm of surgery. Preventive medicine, whether of the body or the mind, is unspectacular, and in rightly acclaiming progress in surgery, such as the so-called "blue-baby" operation, we must not overlook the fact that from the aspect of saving life and giving true health the construction of a new housing estate may do more than a thousand operations. Not that this detracts from the importance of surgery.

For more than ten years attempts have been made to

construct a practical oxygenator and especially an "artificial heart" in which the blood would be oxygenated and then rhythmically pumped at the proper pressure to the circulatory system. Great technical difficulties have been slowly overcome and it is now claimed that animals have been kept alive for several hours with their hearts "short circuited." The greatest caution will be necessary in using such devices on human beings, but the apparatus is likely to be valuable not only in permitting more extensive surgery, but in the avoidance of shock or the possibility of "restoring life" in certain cases of heart failure due to causes other than serious organic breakdown.

In the course of time the collaboration of engineers and medical men may show the way to the production of other artificial organs which will enable the natural parts to be "rested" or operated upon with safety. These devices do not, of course, increase the span of life except in the sense that they enable an individual to survive a particular period during which life might have failed. In the distant future it is conceivable that life might be pro-

longed by artificial organs replacing or supplementing the natural, and that a "heart aid" will become as common as is a hearing aid today. That time is far away but it is made all the more interesting by recent successful tests of artificial lungs and kidneys.

The skill with which ears, noses and lips can now be replaced makes it clear that the art of graft will be enormously extended. Beginning with the simplest forms of membrane, it is now not very difficult to build up new faces, and claims have been made for replacements of complete limbs in some countries. In the next fifty years advances will be made even more sensational than those which have taken place since the not very distant time when surgeons operated in frock coats which were fashionably covered in dried blood and pus.

We can be certain that legislation must eventually be introduced to control what might become an almost wholesale market in human parts. Ears can now be purchased, the cornea of an eye from a recently dead person is commonly employed to cure certain forms of partial blindness, and there is no

doubt at all that many more complicated structures will soon be replaceable; we have already blood banks and bone banks, and part uterus grafts are entirely successful.

Another long expected medical advance will be the discovery of methods of securing anæsthesia without the use of ordinary drugs. Great progress has been made since the early days of chloroform, which is now seldom used for general purposes, but no "perfect" anæsthetic has been found. The anæsthetist has a considerable range at his disposal, each with its advantages and none without its own restrictions; the drug that secures the unconsciousness and relaxation desired may also over-affect breathing, the heart, or other functions of the body. Hypnotism has been suggested for various minor operations with the advantage claimed that it produces no physiological change, and although quite impracticable for ordinary service it is possible that it may lead to some method of electric brain control. Scien-

tists claim to have produced sleep artificially by the aid of electrical impulses similar to those found in a person who is sleeping naturally. Development of this technique into full anæsthesia might have great advantages for the surgeon and for the patient, who would endure none of the unpleasant after-effects experienced with so many chemical anæsthetics.

Of one advance in this direction we can be sure: pain will be regarded with the horror which we have now for operations in the days when no relief was possible. Patients will not be told to be "plucky" or given local anæsthesia while the senses remain to be shocked. Pain indicates failure to know the human body as an entity, a fact which has become well recognised in methods of childbirth now generally adopted in the face of bitter criticism only a few years ago, when the experts of church and medicine quoted the biblical reference to "pain and suffering" as a counter to scientific argument.

Pogsmith was a planet and a super-beast. The former had a negative escape velocity, the latter a positively escapist ferocity!

Pogsmith

by *BRIAN W. ALDISS*

DUSTY MILLER AND HIS wife were lucky. Not lucky to be on a year's holiday, because everyone higher than esp-inspectors qualified nowadays. Not lucky to be on Mercury, because although the new atmosphere breathed well enough it had not yet stabilised and typhoons were frequent. Not lucky to visit the Galactic Zoo, because its gates were open wide to all who could afford the entrance fee. But lucky because they were the one millionth and one millionth and one (or one million and oneth) human beings to go in.

The celebration of this numerical achievement entailed a lavish lunch, followed by a personally conducted tour round the zoo by the director.

"I don't like him," Daisy whispered.

"Shut up, he'll hear you," Dusty snapped. He had reason for his belief. The director possessed three of the largest ears Dusty had ever seen. But then the director had been hatched on Puss II.

Nevertheless, the tour was highly stimulating. Dusty was delighted with every animal he saw. His wife was less happy, but she never enjoyed wearing space suits; by a quirkish, claustrophobic effect, they gave her asthma. Unfortunately, they were highly necessary, since each block of the zoo naturally contained the atmosphere of the planet whose animals it housed—and nine-tenths of them were nothing less than death to human nostrils.

They had visited the Puss II block, whose inmates looked, to Daisy and Dusty, surprisingly like their dis-

tinguished escort, and had traversed the impressive Ogæiou chain of buildings housing the Knitosaur, gigantic crabs which weaved their own shells from a natural-nylon seaweed, when they came to a large domed erection.

"This," the director claimed impressively, "is our latest addition to the zoo. Within, we shall find the only extant life form of the newly discovered planet, Pogsmith."

"Wasn't that the place there was all that fuss about?" Daisy asked.

"There is always a fuss about a newly discovered planet," the Director said, severely. "Territorial rights, etc. . . ."

"Shall we go in?" Dusty asked, hastily. He had known for years that his wife was dull and provincial; he just happened to love her that way. While for the director he held every respect—but a growing repulsion.

"First," replied the great man, "depress the yellow switch you will feel just in front of the central ridge of your helmets." He showed them by example. "That will protect us from the thought waves which this creature

sends out. It sets in action a dead field about the brain."

He looked pointedly at Daisy, as if to imply that she was already safeguarded by such means. When they had complied, they entered.

The ground plan was the usual one. A spiralling observation ramp circled an enormous glassite dome which contained the alien species and fragments of its customary surroundings. At the beginning of the ramp was a fortified gate into the dome and a large panel of information, such as details of topography, atmosphere, planetary year, etc.

The lighting was dim.

"Low angstrom range," the director commented.

"I can't see them," Dusty said, peering into the bowl of gloom.

"It," said the director. "We only managed to catch one."

"What is the name of the species?"

"Er—Pogsmith."

"Oh . . . After the planet? I thought they only named dominant species after the planet?"

"This is the only, consequently the dominant, species, Mr. Miller."

"I see. Then how do you

know they are not—people, rather than animals?”

“Why, they *behave* like animals.”

“I don’t see that that’s any—never mind; where is this creature, Mr. Director? I can see nothing in there but an old bucket.”

“That, at the moment, is Pogsmith.”

Taking hold of a wheel set in an upright in the glassite, the director spun it, setting in motion an automatic prod-der. It reached out and tipped the bucket gently over. The bucket turned smoothly into a red nose, from which a hand extended in the direction of the director.

The latter coughed, turned away, and said: “Until the creature condescends to turn into its usual shape, you might be interested to hear about the first and only expedition to the strange and remote planet of Pogsmith.”

“Well, thanks very much,” Daisy said, “but I think perhaps we’d better be——”

“It so happens,” the director said, “I was on the exploratory ship as zoologist at the time. You are singularly fortunate to hear this first-hand account.

“Pogsmith the planet was

so named after Pogsmith, our radio operator—a sort of memorial to the poor fellow. The only thing they had in common were peculiar features. The operator had one eye and a ginger beard, and the planet—well . . .” He rotated his claws in the famous Pusss gesture of amazement.

“Pogsmith is the only planet in a system of three giant suns, a red, a yellow and a blue one. It is smaller than Mercury, and, containing no heavy metals, has an extremely low density. Yet during a period of its orbit it comes almost within Roche’s Limit of two of the suns. The wonder is that this fragile little world did not disintegrate eons ago! It only seems to survive this perilous part of its course by speeding up its axial revolution tremendously.

“This we noted as we glided in for a landing. The amazing thing was that the planet held an atmosphere, a pungent mixture of neon and argon that we found stayed electrostatically attracted to the surface, due to the continual absorption through it of random and charged gamma particles which combined——”

Noting the blank expression on Dusty's face, the director cleared both his throats and changed his tack.

"There were no seas, but the ground was broken and mountainous. We found a plain near the equator and feathered down. The ship immediately rose again. The captain swore, touched the fore jets and set our tail firmly in the dust once more. The ship was immediately flung back into the air. We could not stay down! So we floated and chewed our nails. On other planets, the difficulty is always getting off them; yet here the situation was paradoxically reversed.

"Everyone was completely baffled, until I came forward with the obvious solution. The planet's mass was so low and its axial rotation so fast that centrifugal force had overcome gravity at the equator! Following my careful instructions, the captain moved to the north pole, and there we could land in the usual manner. An additional advantage was the lower temperature—only 160 degrees. At the equator it had been about 245 degrees.

"I only tell you this to make the point that any life

on such a world was bound to be eccentric."

"Oh, quite, director. Daisy, dear, are you alright?" Dusty Miller bent anxiously over his wife, who was fluttering her eyes.

"Yes, fine, thank you. Don't interrupt, dear. You were saying, sir?"

We climbed out, the five of us—in space suits, of course (the director said.) It was eerie to a degree. The sky was nearly black, owing to the tenuous atmosphere, although there were a few very low grey clouds. The blue sun moved from about five to twenty degrees above the horizon, revolving so rapidly round the sky that it looked like an azure spiral. Every now and then, the red sun would appear, climb to zenith and sink again. Unfortunately, we were too far north to see the third sun; I remember feeling vaguely aggrieved about it at the time.

What a spectacle, though! We stood, amazed. Both visible suns were at least fourteen times as big as a full moon on Earth and their shifting, blending shadows spun a kaleidoscope of stupendous colour. We cried our

delight aloud, lifting up hands that had become unpredictable rainbows.

Pogsmith had no eye for beauty. He had, as I said, only one eye, and this was on the main chance. He disappeared over that low hill which is always near any spaceship about to encounter danger in all the science fiction stories I have read. We heard his startled shout, and ran to see what was wrong. A hundred yards ahead of him was a torpedo. It was scampering towards him. It had legs. These changed to wheels, and the wheels to flappers.

Abruptly it stopped. It changed again—into something very like a terrestrial pig. That, we have found since, is its natural form. But under the fluctuating conditions that exist on its world it has developed protective and projective mimicry to an extraordinary degree.

"Come on," Pogsmith belated, "let's capture it!"

I was naturally in favour of the idea. But Pogsmith acted first.

He flung himself on the creature. It was an unwise thing to do, and I should have behaved differently. Even

as he moved, the amazing animal altered its form again. It grew boots, a ginger beard, a space suit. It turned, in fact, into an absolute double of Pogsmith.

They fought desperately together. We closed in upon them and pulled them apart—no easy matter for only four of us.

Then came a problem. Which of them was Pogsmith? Neither showed any inclination to turn into anything further. The pig, with a good deal of common sense, realised he was safe in his disguise.

Both cursed when we prodded them. Both vowed he was the only genuine and original Pogsmith. Both begged to be released.

So, at my suggestion, we released them, the idea being that the fake would immediately attempt to escape. But no, both stood tamely there and suggested a return to the ship. Evidently the pig's curiosity had been roused.

We only resolved the deadlock by a brilliant idea of mine. Obviously the creature could only simulate outward appearances; we had but to

take blood slides to tell one Pogsmith from the other.

They both came meekly to the air lock. But there a strange thing happened. We stopped. We looked again at the twins. The Captain spoke first.

"Silly of us," he said. "I know which the real Pogsmith is—it's this one," and he clapped his hand on the nearer of the two.

We all agreed vehemently with him. At the time it was suddenly more than obvious which was which. We pushed away the one we decided was the fake and hurried into the ship, shutting the lock behind us.

"Phew!" one of the crew said. "Lucky we suddenly saw sense. Let's get away from here!"

And so we did. We were off and away at once, leaving the planet and its suns far behind. The incident had destroyed a lot of our self-confidence; for one thing, no doubt each of us had the thought—supposing more of the creatures had come up and joined in the fun? Should we ever have sorted ourselves out?

Pogsmith, always taciturn, was more silent than ever.

We did not like to remind him of his unpleasant experience, but finally I asked: "Are you feeling yourself again, Pogsmith?"

For reply, he winked his one eye at me and slowly—turned into a pig!

We saw it all then. We had been tricked by some form of mass hypnotism into leaving the real radio op behind. By then, we were three days spaceborne, and poor old Pogsmith had air enough for, at a maximum, thirty-six hours. What could we do? As a memorial to our late friend, we christened the planet Pogsmith, and kept heading for home.

The crew were not only furious with the creature, they were frightened of it, and its power. They voted to scoot it out of the airlock at once. But I spoke up in the cause of science, and explained what a valuable zoological discovery we had made. After much argument, the masquerader's life was saved, and we brought it here, to the zoo.

There was a short silence in the dome.

"A very extraordinary tale, indeed!" Dusty Miller exclaimed.

"The truth is frequently extraordinary," the director said, with emphasis.

"Do you reckon he's pulling our legs?" Daisy whispered to her husband.

"I don't know."

They turned and stared solemnly into the arena. Pogsmith had resumed its natural form. It was decidedly porcine, although its face bore an expression of almost classical serenity seldom noticeable on pig countenances. Seeing it was being observed, it commenced to change shape.

"Actually, it is rather parrot-like," the director said contemptuously. "It never composes its own shape; almost always copies something it has seen. Look, you notice it is doing me now . . ."

Mrs. Miller let out a loud shriek.

"When has it seen you naked?" she asked.

"Madam, I assure you I'm not——"

"Never mind how good the likeness is," Dusty said, sternly. "I did not bring my wife here to be insulted by that obscene creature or anyone else! I suggest we leave this instant."

"Very well then," snapped the director, angrily, "although

I am in no way responsible for that thing's behaviour."

"Do let's get out," Daisy said, her face still crimson. "Take my arm, Nathaniel."

"You go on, dear, with the director. I won't be a minute—I just want to read this information panel again."

He prodded her surreptitiously in the ribs to make sure he was obeyed. As soon as they were out of sight, he tried the inner door. It was merely a portion of the arena wall, indistinguishable from within, but easily movable from without by the turn of a wheel.

"We'll soon see whether it wasn't a pack of nonsense he was telling us," Dusty muttered to himself. He never liked to believe anything until he had personally tested its veracity. The next moment, he was inside the dome.

The naked director withered and shrunk into Pogsmith's natural shape. It turned and faced Dusty inquisitively, snorting quietly.

"All right, old boy, there, there now, just want to have a proper look at you," Dusty said, soothingly, making a coaxing noise and extending one hand. For a moment he was alarmed at his temerity.

Was the thing carnivorous or not? He halted. They surveyed each other from five yards' range.

"The lighting isn't very good in here," Dusty said, apologetically. "Let's see some of these stunts from close range."

As if it understood—how efficient was that dead field round the brain—the pig, with astonishing speed, grew a ginger beard and arms. It became Pogsmith. One eye glared at Dusty.

"This is a devil of a predicament," it said. With animal savagery it flung itself at Dusty, catching him a knock-out blow on the jaw, and bolted for the open door.

Feebly, he opened his eyes. An angry face glared down into his; it was the director.

"Ah, Miller, conscious at last! Well, your visit to us is over. There's an auto-rocket here standing by to take you and your wife straight back to Earth."

"Pogsmith?" groaned Dusty.

"You may very well ask! The unhappy creature must have been almost crazed by boredom from its confinement. It is now hiding among the

zoo buildings, having so far eluded all our efforts to recapture it. You're lucky you weren't killed. Your infernal curiosity is going to cost us a pretty penny, I can tell you! You're a mischief maker, sir, that's what—a mischief maker!"

"You won't find Pogsmith by raving at me," Dusty retorted, irritably, brushing dust out of his clothes.

"Can't you see the poor man's had enough, director?" Daisy asked, turning, nevertheless, to the poor man in question to whisper fiercely: "A brilliant performance *you've* made of yourself, Nathaniel. Just you wait . . ."

Dusty rubbed an aching jaw and followed dejectedly along a metal ramp which led to a two-man shuttle. It was a small Mercury-Earth ship that would travel auto all the way: in five minutes he could be away from the scene of his foolishness—and there would be no eavesdroppers on whatever lecture was coming.

The director followed them to the open hatch. There he caught Dusty's arm.

"No ill feelings," he said.

Miller shook the director's hand and his own head dazedly and passed into the ship.

With a quiet click, the door closed behind him. He staggered through the air-lock and sunk onto an acceleration couch.

Daisy had hardly begun to unload her vocabulary before the growl of blast take-off drowned all other sounds. They hurtled upwards, and in two breath-taking minutes stars and darkness showed outside and the bright crescent of Mercury floated below.

"Now . . ." said Daisy. "Never in all my life——" She stopped, her mouth hung open, her eyes fixed glassily on a point behind Dusty's head. He turned.

The door of a small luggage store had opened. A figure, as like the director's as an egg is like an egg, stood there glaring at them.

"How——" said Dusty.

"Pogsmith's tricked us," said the director. "He bound and gagged me—pushed me in here—I've only just struggled free. I—Ooooh!"

He staggered back as Dusty attacked him. His foot slipped and he fell against the wall. Dusty pinned his arms behind his back.

"Quick, Daisy, quick!" Dusty bellowed. "Help me get him into the air-lock. It's Pogsmith!"

She stood there wringing her hands helplessly. "How do you know this is Pogsmith?" she asked.

"Of course it's Pogsmith," snapped Dusty, glad to be again master of the situation. "Isn't it obvious he'd try and escape like this? I'm not being fooled twice. Now lend a hand, will you?"

Still struggling and protesting, the director was propelled into the air-lock and shut in. Mopping his brow, Dusty pressed the manual switch that opened the outer door. There was a hiss of expiring air and expiring director.

"I've saved you life, lass," said Dusty, pointedly. He adjusted his tie.

At the Galactic Zoo, the incident was soon forgotten. The director quickly recovered his old prestige. But he was never the same man again—he had a tendency, in private, to grow red whiskers and one triumphant eye.

PLANETARY EXPLORATION

5 . . . THE GEOLOGIST

another article from the future

AT THE BEGINNING OF THE TWENTY-first century the "dowser" who found water with a hazel twig or oil with a pair of boot laces could still make a living. Now it takes me all my time to believe that water divining was ever possible and but for the evidence of contemporary scientific reports I should flatly refuse to do so. However, whether or not there were people who by some sixth sense could detect reflected particles, is of no consequence today. We know to a foot the extent of every layer of the earth's crust whether it be liquid, solid or gas filled cavity.

We do not know the geology of the planets. Soon we shall do so and glory be to all the Gods of Time and Space, I am to be one of those to learn it first.

Geology used to be called the study of old fossils by old fossils. Well, we still include fossils in our studies and many of us have a soft spot for them. In fact, fossils are to the geologist what fire-works are to the chemist—a minor branch of his activities inevitably associated with him in the mind of the common man. The geologist is concerned fundamentally with things

as they are, certainly, but nevertheless it is he who has provided mankind with knowledge of a thousand histories before history began.

ROCKS OF AGES

We shall arrive on a planet, and before I leave it again I shall know much of its history over the many ages that have passed since its fiery genesis. When I get back I shall write the Book of Genesis for another world. When a rice pudding comes out of the oven the skin is smooth and distended. If the pudding is left to go cold the skin settles down over the shrinking mass and folds and refolds itself into constantly changing hills and valleys until the temperature is in equilibrium with its surroundings.

The crust that forms on a planet soon after it leaves its parent sun subsides over the billions of centuries during which its inner core continues to contract. As it does so it folds and refolds in century after century of complexity of deep valleys, broad plains and mountain ranges. Here on Earth it took Man centuries to reconstruct the many changes involving mountain ranges that had sunk



below the oceans thousands of years before the Andes or the Himalayas had begun their slow ascent above sea level. Now, in this twenty-first century, we know with reasonable certainty the shape and location of new oceans to be and new mountains to rise a billion years after the Andes and the Himalayas have sunk back to be no longer discernible. I shall be able to gather in a matter of weeks sufficient data to be able to compile on my return the story of most of the great depressions and upheavals that will have taken place on this new world from the very beginning of its cooling.

Man's knowledge of the Earth grew slowly as he followed the strata on the cliff face of an eroded mountain, or dug his mines, or studied the successive cores produced by his boring with the earlier oil-well sinking equipment. Now we have a whole range of wave form with which we can probe layer by layer the constituent rocks of the Earth's crust to a depth of a hundred miles. My great-grandfather between the first and second world wars of the twentieth century spent several years in the sands of Persia exploding charges of dynamite and detecting the echoes from submerged rocks. In this way he could build acre by acre a contour model of a layer of

rock beneath him (this he did, incidentally, in order to predict the most profitable sites for oil wells). From such a crude beginning we have come to the point where a helicopter can spiral or traverse with parallel lines a thousand square miles of territory in a single day, emitting waves from thimble-sized transmitters and receiving echoes on multiple detector scanners. Tape recordings of the reflected impulses can later be fed into a machine which automatically produces a block of stratified plastic material. From this block sheet after sheet can be lifted and examined separately. Examination of each of these sheets reveals the distribution, contour configuration and basic chemical constitution of layer after layer of the rocks below the territory covered in the day's stint.

SURVEY PURPOSES

Such a survey as that indicated will not be a mere aimless accumulation of information. When being briefed for my assignment I was left in no doubt as to what was expected of me. I was not to be a free-minded scientist going to carry out a piece of purely academic research. The people who had put their money into the project were not altruistic patrons of science but hard-headed, would-be exploiters of the



resources of other worlds. That is why they wanted a geologist.

In the physical world physical effects have physical causes. A mountain range does not rise out of the ocean depths unless it is pushed up, and it takes an awful lot of pushing. The rice pudding analogy was only part of the story. As so often happens the purely academic interest of a scientist in some unexplored realm, apparently barren, becomes suddenly abundantly fruitful. Thirty years ago as a young graduate in geology I realised that with the new techniques available it was possible to recount all the foldings and crinklings of Earth's cooling crust. I tackled the problem of doing so in a dilettante fashion, thinking that at most there would be a possible thesis in it that might be acceptable to the University authorities and gain me a Doctorate. After twelve months' work I realised that the forces produced by the cooling effects as the Earth aged were quite inadequate to account for what had actually taken place. New continents had appeared and old ones had vanished where nothing more than a new chain of islands or a slight shifting of a continental shelf should have been expected. In those days the depth of penetration of our probing was a mere ten miles or so. I realised that somewhere below all that there was some new secret to be unearthed. Unearthed was the word.

DEEPER AND DEEPER

For the next three years I sought out every paper published by any of the world's scientific societies in their journals for any new work that would have any bearing on the problem of discovering more about what went on further and further below the Earth's surface. I chivied my physicist acquaintances for their tardiness in producing the necessary tools. I harried the electronic engineering firms to induce them to tackle the problem of devising new transmitters and detectors of each new wave emanation that science discovered.

And all the time I harassed my mind to try to become aware of what I might expect to discover deeper and deeper that would account for the otherwise unexplainable geophysical phenomena that had occurred as the world formed and re-formed the many maps of the past that I had been able to draw.

My efforts were greatly obstructed by what scientists, economists, and above all, financiers considered to be the most urgent need of our time. Coal and mineral oils had been so extensively exploited during the twentieth century as sources of power that now there was barely sufficient available for the far more legitimate purposes of feeding the pharmaceutical manufacturers, dyestuff makers, plastics industries and the many other enterprises which make use of the naturally occurring large molecules that the boiler houses of power plants and the cylinders of internal combustion engines had profligately disrupted. Then heaven-sent came my inspiration.



Atomic power plants, the first fruits of post second world war reconstruction, had by that time reached an advanced stage and were obviously the hope of the world—the world that had come to be so utterly dependent on enormous annual consumption of power to support a way of life that was rich in all the good things sent richly to enjoy by the nations which, having learned to live at peace with one another, merited prosperity. The problem that was so urgent was where to find an adequate supply of uranium and other sources of fissionable material. The day I realised that it was just such sources of energy that had produced my otherwise unpredictable mountains, I solved my own little personal problem and cured the world's last headache.

It was not cooling from the outside that had wrought all the vast changes in the thin shell then known to the geologist, but doubly conversely they had been brought about by heating from the inside. The acceptance of

my theory as worthy of investigation secured me the technical research facilities of the universities and industry alike, not to mention the financial support of the latter. There must be, I suggested, deep in the earth, large concentrations in certain places of just such material as those of which we were in need. Moreover, with the aid of the mathematician, I was able to indicate roughly where these new Eldorados might be found. I knew that if means could be found to determine the composition of the crust and the deep rock contours of the Earth, it would be possible to pin point the new wealth with hairsbreadth accuracy. Once I had the right people convinced that this was, indeed, the case, the necessary equipment was produced in a matter of weeks. The result is that now Mankind has sufficient power at his command to do all on Earth that can be conceived as in any way desirable, and is now able to begin the conquest of space.

Nor do I have to tell you why one of the first problems to be solved on

reaching a planet will be to locate its own sources of power. By developing the power sources of a planet we shall be able to make it self-supporting. If it has no atmosphere we shall be able to make one for it. If it has no water we shall be able to inundate it, blasting if need be the basins in which to pour new oceans. If it is cold we shall girdle it with warmth, if it is too hot we shall give it polar icecaps to create



Photos; Petroleum Information Bureau

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Austerity is no fun for anybody, but plenty needn't be so nice, either . . .

KWAKIUTL

by DAN MORGAN

THAT TRI-DI RECEIVER IN the window—five hundred, isn't it?" said Roger Callet.

The slick-haired salesman smiled.

"That's correct, sir. I can see that you're a gentleman who appreciates the good things of life."

"I'll take it," said Callet, feeling in his inside breast pocket for his cheque book.

"This is the finest Tri-Di on the market," said the salesman. He started to walk over towards the open back of the window. "Perhaps you would like a demonstration?"

"That will not be necessary," said Callet, as he completed the cheque with a careless flourish and tore it out of the book. "I want it delivered before six o'clock this evening."

"And the address, sir?"

"Ninety-four, Fifteenth Avenue," replied Callet, eyeing the huge transparent

plastic and gold receiver with a grin of satisfaction. Jane would just love it . . .

"I have a delivery van due back in five minutes," said the salesman. "Is your home equipped with the correct type of antenna for this type of receiver? I can send a technician along first thing in the morning, if you haven't one."

Callet placed his cheque book back in his pocket. "Don't bother about that—just send it along. But make sure it's there before six o'clock. O.K.?"

He strolled out of the shop. The salesman stared after him for a moment. Something like frustration overcast his professionally urbane features.

"Those Jonesian Wheelers," he murmured. "A man could get out of practice serving people like that all the time."

Callet stood for a moment on the sidewalk, watching

the rush-hour crowd. He glanced at his watch. Time for a drink before he went home—that would give him a better chance of a more comfortable journey, as well. He walked along in the direction of Mike's Bar.

The usual sprinkling of early evening drinkers was scattered around the room. There was something about the old-time atmosphere of the place, with its chrome furniture and mirrored walls, that gave the city workers a feeling of relaxed comfort. Callet found a stool about halfway along the counter and sat down.

Mike, the bartender, walked over, smiling. "Evening, Mr. Callet. What'll it be—the usual?"

Callet nodded and Mike poured him a brimming glass of scotch. "Hear you're having a party tonight," he said, as he pushed the glass across the counter. "That's a mighty fine Wheel you're a member of . . . Real classy people, I guess."

"My, my! The news does get around," said Callet, sipping his drink. "Still, it should be something pretty special, at that."

The bartender leaned over towards Callet. His voice

dropped to a confidential tone. "I've got something that might interest you, Mr. Callet. Just the thing for a party—shall I bring it along?"

"Of course," replied Callet. "We want to do this thing right. Jane, my wife, likes to put on a really good show—you know the way these women are."

Mike walked along to the far end of the bar and bent beneath the counter. His bald head bobbed up again a moment later and he walked back towards Callet, carrying a tissue-wrapped bottle. He placed the bottle on the counter between them and pulled the tissue to one side reverently, exhibiting the label.

"Genuine Napoleon Brandy," he breathed. "Ninety-five per cent. proof, and smooth as mother's milk to the palate. How's that for you?"

"Who the heck's going to drink it?" said Callet, with a grin. He pulled a wad of bills out of his pocket. "How much?"

"Fifteen pounds, to you, Mr. Callet."

"You made yourself a sale, Mike." Callet peeled a twenty from the wad and placed it on the counter. "Keep the

change, and thanks for the suggestion."

The bartender murmured his thanks and walked over to the till. Callet moved to take another sip of his drink—and stopped as he noticed that the glass was almost half empty. He put it back on the counter untouched and pushed it to one side. He glanced at the clock over the bar. Still time for another one before he started for home. Maybe it would help with his party nerves.

"Hey, Mike. The same again, please."

The bartender took a fresh glass from the shelf and poured out another drink. He placed it in front of Callet and reached out towards the discarded glass.

Out of the corner of his eye Callet noticed the singularly dirty hand with untrimmed, clawlike nails that forestalled the bartender.

Mike swore. "What are you doing in here again? I thought I told you to keep out?"

Callet turned curiously. Behind him stood a short man in an old brown overcoat and a battered, black, old-fashioned hat. The man was clutching the drink to his

lips thirstily. It was Holy Joe. Callet had seen him in Mike's before; it was part of the old world charm of the place to see such characters around. The old man must be over eighty years old—the fact that he remembered three wars made that obvious. Mankind had given up that kind of stupidity over fifty years ago.

Mike was lifting the counter flap, preparing to throw the tramp out.

"O.K., Mike—let him have the drink. It's not important," Callet said.

The bartender stopped. A flash of annoyance lit his pugilistic features. "Well—if you say so, Mr. Callet." He lowered the flap, still glowering at the tramp. Then he turned with a shrug, walked along to the other end of the bar and started polishing glasses vigorously.

Holy Joe finished the drink, smacking his lips with relish. Regarding the empty glass regretfully he placed it back on the counter. He turned to Callet.

"Thank's a lot, mister. You've got something of a neighbourly feeling about you—there isn't much of that around these days. I remem-

ber the time, before the last war, when people used to be real friendly."

Callet laughed. "That doesn't quite fit, old timer. How could friendly people have wars? Today we've got peace and full production. Surely that's better than your *neighbourly* massacres?"

"You want an argument?" said the old man. "The life you people live today is empty and sinful. Look at that . . ." He pointed to the quantity of half empty glasses that were scattered along the counter. "When I was a boy I was taught that it was sinful to waste things, but you people think it's clever."

"Surely you don't expect people would finish the whole glassful. It's . . . insanitary," said Callet. Discomfortingly, he found himself wondering if he really believed what he was saying. "We don't waste millions of pounds worth of materials on wars now, Joe. There's plenty of everything for everybody, so what does it matter?"

"Yes, times have changed," said Joe. "No wars, Welfare State, Jonesian Wheels. I bet you don't know how the Wheels originated, do you?"

It used to be a joke, when I was a boy, '*keeping up with the Jones's*.' That's what the whole human race is today—a tragic joke, that's gone on too long."

"It wouldn't have lasted this long under the old system," said Callet, slightly ruffled. "A few more cobalt bombs and the race would have been finished altogether."

The old man was not listening. He had picked another half empty glass off the counter and was sipping it like a rare wine.

"Welfare State!" he said, at length. "A man can't even starve to death if he wants to. If he doesn't work, he eats just the same. There's nothing to work for."

"What about social life?" said Callet.

"Oh, yes," sneered the old man. "You're a social big timer, a Jonesian Wheeler. You're throwing a party to-night—for who? A few crumbs in your bracket, people you don't even like. When we had a party we really had fun, but you . . ."

Callet smiled at the old man's strangely primitive ideas. "Where did it get you?" he asked.

The old man's red-rimmed

eyes held an expression of pity. "You really don't know, do you?"

Callet lit a cigarette. He hesitated a moment, then offered one to the old man, *damn him*. The strange creature accepted it graciously—absolutely no social sense.

Callet took another sip of his drink and puffed his cigarette for a few seconds in silence. He replaced the glass and threw away the half-smoked butt.

The old man's voice was shrill. "See? See what I mean? There's ten minutes more smoke in that, but you threw it away. It's wrong, I tell you."

Callet eased himself off the stool—the old man was beginning to annoy him. Characters were fun . . . in small doses.

"Never mind, Joe. You have it your way and I'll have it mine, eh?" He picked up the bottle of brandy and walked out of the bar.

Callet closed the flat door behind him and, taking off his overcoat, threw it in the corner.

"You home, Jane?" he shouted.

"Through here, darling,"

came a sweet, high-pitched voice from the bedroom. Callet walked over slowly. Jane was sitting at the dressing table, doing something to her honey-blonde hair. As far as he could see, it looked fine.

Jane looked at his reflection in the mirror.

"You don't look very happy, Rog. Cheer up, tonight's the big night!"

He smiled. Jane loved parties and she was the perfect little hostess. Every little nuance of social behaviour and conversation seemed to come to her naturally. On his own, Callet might have become a drifter, even a *non-Wheeler*, but the pleasure of seeing Jane's enjoyment at the monthly parties made him work all the harder at being a solid citizen. But tonight, somehow . . .

"You must be tired, darling," said Jane. "Go and have a shower—then we'll have time for a quiet drink together before they start arriving."

He nodded and walked through into the bathroom. Stripping off his suit, he pushed it into the disposal chute and stepped into the shower. The warm, scented

water gave him a drowsy feeling of well-being. Deliberately he punched the button and ice-cold water jetted out onto his lethargic body, making him wince.

Jane was sitting in the lounge with a drink already poured. He sat in the large comfortable chair opposite her and sipped it.

"Jane," he said quietly. She looked up. "Did it ever occur to you that we might finish a drink sometime, or smoke all of a cigarette . . . or even eat all of a meal?"

She looked up at him, shocked. "What a ridiculous idea, darling!"

"What's ridiculous about it?" He eyed her over the rim of the glass. "Why should we throw away at least half of everything instead of consuming it?"

"That's not the point, darling. *Nobody* ever drinks all of their drink, you know that. It's just not done, that's all. Really, Rog, you must be in a filthy mood. It's too bad of you—tonight, of all nights. Snap out of it."

He smiled at her guiltily. "I'm sorry. I don't know what I must have been thinking of. I . . ."

The doorbell rang and

closed the embarrassing conversation. It was the men with the Tri-Di. Jane unlocked the party room and Callet guided the two men through with the huge crate. They placed it to his instructions in the middle of the room, directly in front of the viewing window and unpacked the receiver.

"Man, this must have set him back a pile!" said one of the delivery men, gazing admiringly around at the sumptuous furniture and feeling the luxurious springiness of the nylon carpet with his feet.

Jane gave a little squeal of delight as the wrappings fell away from the Tri-Di and it stood in all its gleaming, expensive newness. Callet smiled to see her happiness and gave the men a generous tip.

"Isn't it enormous?" said Jane, as the men left. "Really, darling, it will make a wonderful centre piece for tonight."

"I thought you'd like it," said Callet. "We've got a lot of other stuff, of course, but this will really pull off the trick."

"I'm sure it will," giggled Jane. "I can hardly wait to see that fat Amy Thompson's

face." They walked arm in arm back into the lounge and had another drink together.

The guests started arriving soon after seven o'clock. Bill and Joan Walter were the first; she a mousy little woman and he a fitting partner. Nice people, working hard at being good Wheelers, but no competition for the go-ahead Callets. Next came Jack Mostyn and his wife Audrey. Jack was an executive on the top floor of Callet's building, a smart operator with a pencil-thin black moustache. He took in the furnishings of the lounge at a glance.

"You'll have to do better than this, Callet," he said, with a sideways smile.

"Can do!" said Callet with a smug grin, as he heard Jane greeting Audrey Mostyn.

"Where did you get that old rag, dear? Couldn't have cost a penny over fifty pounds . . ."

George and Freda Wilson were next; Freda with her over-ripe bovine figure and George in a dark suit, looking like a seal with a bad case of catarrh.

"Is Thompson coming?" said Mostyn.

"I think he'll be along,"

replied Callet. "I made it pretty clear that we wouldn't take kindly to a default."

Jane opened the serving hatch and started handing round plates piled with food. The doorbell rang again.

"This will be them now," said Callet as he walked over.

The short, froglike Thompson stood on the threshold, his pink tongue moving nervously over his thick lower lip. His wife, a tall hatchet-faced woman, gave him a light shove in the small of the back and the two entered.

"Come along, you two," said Jane. "We were just eating."

"I don't really feel like anything, thank you," murmured Thompson. His wife flashed him a look of annoyance.

The meal proceeded with the usual small talk. The Mostyns were talking about the money they had spent on decorating their house, and their new titanium-lined party room. Walter was boasting about the fabulous amount he was spending on school fees for his eldest son. Callet noted with satisfaction that Thompson did not mention his new copter.

"Well, if everybody has

had enough to eat, we might as well start," said Jane, a few minutes later. Thompson put down the untouched plate of food thankfully.

The couples formed up in the traditional Jonesian Wheel procession and Rog and Jane opened the doors of the party room. They did a slow, clockwise circuit. Naming each article and its price, watching the faces of their guests keenly for any expression of envy.

"... this original oil painting . . . a twentieth century piece by Picasso, cost over two hundred," said Jane. "Wonderful, isn't it? This eighteenth century English chair was ninety-five . . ."

The modern three piece suite gained a flicker from Joan Walter, but her husband looked at her sharply. Finally they turned to the centre of the room and the *piece de resistance*.

"And this," said Jane. "Rog bought only this afternoon—we knew you'd just love it." She assumed an air of studied casualness. "How much did it cost you, dear, by the way?"

"Only five hundred," said Callet. He turned to Thompson, who was fingering the

lapel of his jacket nervously. "Well, as guest of honour, you ought to say a few words before we get started, Fred. O.K.?"

Thompson looked around the group with a sickly grin. "I'd be pleased, Rog. As you know, next month it's our turn. Callet has put on a good show here, there's a lot of expensive stuff . . . I think perhaps we can do better." He looked at his wife. "Of course we're a little low in material goods at the moment, but we're hoping to make it up in time."

Callet and the other members of the Wheel could hardly conceal their pleasure at the lack of confidence in Thompson's manner.

"... These monthly demonstrations of wealth give us a great incentive to keep working," continued Thompson, "and make the membership of a Jonesian Wheel the criterion of solid citizenship. I will now ask our host to start the proceedings in the traditional manner."

Callet turned and picked up the bottle of brandy, which was standing on an exquisitely carved Japanese table. He walked over and smashed it

right into the screen of the Tri-Di. It made a satisfying crash. Jane laughed her triumph, as the expensive spirit trickled down the receiver and stained the pale fawn carpet.

Callet produced a gold-plated igniter from his pocket and set light to the pool of spirit. The flames crept towards the Tri-Di.

"It's going to get hot in here in a few minutes," said Callet, with a confident smile. "I suggest we retire to the viewing booth right away."

Jane opened the transparent fireproof door and the members of the Wheel walked inside. They took their seats, in order of precedence, in front of the viewing window. Callet, as host, sat at the fire controls.

He debated with himself for a moment on the question of technique. Should he use the small levers and shoot out jets of flame on the articles one by one, or send the whole thing up in an explosion of fire by using the main control? The second had the grander effect, but it lacked the slow enjoyment of the slower process. His hand hovered over the levers. He looked out into the party

room, where the Tri-Di receiver was melting away in flames.

He started forward—the door of the party room had opened. The scruffy, drunken figure of Holy Joe staggered in, closing the door behind him. The watchers could hear his heavy breathing through the amplification system as he walked slowly round the room.

The tramp stopped for a long moment in front of the Picasso. Callet was shocked as he saw tears oozing from the red-rimmed, bleary eyes. The old man turned and faced the viewing booth.

"So this is your party, you mad fool." His eyes were fixed accusingly on Callet. "Vandals! Some of the things you have here can never be replaced, do you realise that? You destroy everything to show your stupid wealth."

"The man must be crazy!" said Mostyn. "What's he talking about?"

"No . . . listen," said Callet, in defiance of his own impatience.

" . . . all these irreplaceable things—why? WHY?" continued the old man.

"Oh, the old fool!" wailed Jane. "He's spoiling our party.

Tell him to go away, Rog!" Callet stirred himself as Jane's voice hit a chord of sympathy in his heart.

"Get out, Joe," he shouted into the mike. "Nobody asked you here. You don't have to see this sort of thing if you don't like it." Jane was right; the party was ruined now. He dropped his hands from the controls. There seemed no point in carrying on.

"I'm not going," raved Joe. "You're destroying everything the human race has created! You and other . . ."

Callet caught a flash of movement out of the corner of his eye, as Jane lunged towards him.

"I'm damned if he's going to spoil my party!" she screamed. She pushed Callet to one side and pulled hard on the main fire control.

Tongues of flame gushed

from the walls and ceiling of the party room. For a moment the viewing window showed nothing but ravening fire dancing in a hellish pattern. Callet knocked the cut-off.

The members of the Wheel sat in silence as the smoke cleared. In the room lay the charred remains of Callet's worldly wealth—and a thing that had once been the body of a man.

Only Callet was not watching—his eyes were fixed on Jane. In his mind, her words were a horrible echo—*I'm damned, I'm damned . . .*

Mostyn turned, a smile of admiration on his well-groomed features.

"Why, you old dog! What a wonderful climax! I do believe you've started a new trend. There must be dozens of old fools like that in a city this size—nobody would ever miss them!"

THE BIG HOP

Second and final instalment of J. T. McIntosh's enthralling story. Supporting short stories by J. F. Burke, Robert Presslie and Aubrey Burl. Non-fiction includes another article by Professor A. M. Low and a host of other interesting and illustrated articles.

AUTHENTIC ————— A MONTHLY MUST

THE GUIDED BOMB—Continued from page 42.

brief level run, the missile is probably made to climb, accelerating rapidly to its designed mach number ($M=1.5-2.0$) as it moves over the hump of its controlled trajectory. It is possible that mid-course control is obtained by an automatic programming device, the missile being released over a known point on the ground at a certain height and speed, and subsequently controlled by a flight plan pre-recorded on steel tape, which is fed into a pilot monitor. Thus, the missile is made to execute a series of manoeuvres causing it to climb and dive, its motor being cut in and out, in a pre-determined sequence that has been computed mathematically before the flight.

This system is, of course, immune to enemy interference, but errors due to wind drift may be sufficient to require a terminal control whereby corrective signals are given to the missile by remote command from the parent bomber, in conjunction with radar. Needless to say, efforts are being made to perfect a guidance system that is wholly automatic.

The Rascal is designed to reach its objective in a supersonic dive and can carry an atomic warhead which is pre-set to "air-burst" over the target.

Among other types of air-launched missiles currently under development are guided weapons designed to seek out and destroy submarines. One of these, the Petrel, is a missile with cruciform wings, powered by a Fairchild J.44 turbo-jet of approximately 1,000 lb. thrust. The weapon is said to have an air-range of twenty miles and to operate an underwater self-homing device. Development is in the hands of Fairchild's Guided Missiles

Division in association with the U.S. Navy Bureau of Ordnance. One of the first aircraft to carry this weapon will be the Bell HSL-1 anti-submarine helicopter.

The Petrel is in some respects reminiscent of the Hs.294, an air-to-sea guided bomb of German manufacture. This rocket-propelled "glide-bomb" (a companion development to the more familiar air-to-surface Hs.293) was intended for use against surface ships and was capable of a short undersurface run, the wings and rocket motors breaking off as the missile entered the water close to the target. A contact fuse, which did not function on impact with the water, was designed to operate on impact with the ship below the waterline.

These are just a few of the fundamental problems associated with the development of guided bombs. It would be folly to suggest that such weapons will be easy to produce and some of the control techniques, like the inertial system, will involve great efforts in research to obtain the desired navigational precision, to say nothing of reliability. Yet one thing is certain. When these guided bombs appear, they will be a far cry from their German predecessors, the Fritz X-1 armour-piercing bomb with which the Italian battleship *Roma* was sunk after her surrender in 1944, and the Hs.293 winged bomb which made attacks on Allied shipping (at speeds of 300 to 400 m.p.h.) from release distances of three to five miles.

The advent of small atomic bombs, coupled with improved types of propulsion and control, will make these new weapons superior in every way to anything that has gone before.

This article is reproduced from "Development of the Guided Missile," by Kenneth W. Gatland (1954)

It is not always easy to distinguish a really good robot from a man!

OTHERWISE

by JOHN ASHCROFT

"Oh, yes, Mr. Raynor, sales are certainly booming. And one of our regional managers came up with a brilliant piece of business psychology; you see the motto . . .?"

The visitor nodded, glancing at the plaque on the office wall. It read:

**GIVE HIM THE JOB
HE'S MADE FOR!**

"Well, when one of our men goes out on a round——"

CONNIE JAMES, TWENTY-four, ginger haired, Irish and hot-tempered, tilted the huge kennel on its end and propped it against the back yard fence. She inserted a crowbar into the crack between the two rotten planks, and *wrenched*. Out they sagged with a crunch and splintering

noise. The dog yowled mournfully by her elbow; she shoved him away. As she knelt down he jumped to swab her face with a tongue like a warm dishcloth. Fuming, she locked him in the coal shed and returned to the work.

That a knock somewhere? Silence.

No, couldn't have been.

She shrugged, rested a new plank in place, then held an inch nail against it and pounded it with the hammer. Thud! The iron head banged down. Thud! Again, thud! Again——

"Oooooohhh!"

The wood blurred in a mist of dim agony. She pressed her arm into her stomach, white-faced, her left thumb an inferno of numbing, sickening pain, throbbing ponderously beneath its

bruised nail. Almost sobbing, she scrambled to her feet, reeling dizzily from the shock. Everything spun and rotated and turned inside out for an incredibly long second; then gradually the nausea ebbed away. She felt the blood creeping back up her cheeks; she sensed that the ground was motionless once more beneath her feet.

And realised that she *had* heard knocking. It sounded again. There was someone at the front door. Patch growled. Connie rattled the lock and yelled at him to be quiet.

Of all the times for a visitor to call . . . !

Still carrying the hammer, she walked rather unsteadily through the gate from the yard. Somewhere a thrush sang with a liquid whistling gaiety; the breeze pushed masses of fluff across a blue sky; the sun shimmered in the windows of Jean's house over the road, and all the world was wonderful.

She couldn't have cared less. Under her calm surface the molten lava of her temper was beginning to boil.

There they were at the door: two of them, one very tall and slim, dressed in a dark

suit; the other flashily attired, holding a small case in one hand and the lead of a tiny dog in the other. Both looked round, smiling.

"Ah, and a good afternoon to you, madam," said the stocky man. His voice was harsh but friendly. "We were about to come to the back, hearing the hammering; we had surmised that your husband . . . ?"

"No. *I* was doing it. Hit the wrong nail." She was deliberately curt. The man's case suggested one thing only—salesman. Heaven forbid!

"Indeed, madam? May I see? Why, how distressing; this should be treated——"

"No, it's nothing. Thanks, all the same." She was softening slightly now that the initial agony had subsided. But soon he'd open that case, try to sell her something, and she'd have to be rude to drive him away. A pity. Such a concerned, inoffensive person, despite his raspy tone and jerky mannerisms.

"If you are sure, madam . . . But perhaps I should introduce us—or, rather, perhaps I should introduce myself. Forgive the slip, madam. I have grown accustomed to thinking of my companion

as a human being. But he is not."

"Wha—— Oh? Er . . . well, what is he?"

"A machine."

"I beg your pardon?" This is it, she thought; any minute now the pair of them will crawl across the lawn on hands and knees, chew the grass as they go, brandish one arm in circles and shout, "Chug chug—we're combined harvesters!" She grew worried and tightened her grip on the hammer.

"Yes, yes indeed. Madam, have you ever heard of the science of cybernetics?"

"No . . . I'm afraid I haven't." *Keep them talking.*

"Cybernetics," he said grandly, "is the study of control and communication mechanisms in machines and in living beings. It has given to this eminently fortunate world such marvels as electronic computers which perform the toil of a million mathematicians' lifetimes in but a single moment; such wonders as the self-driven trains and 'buses now operating in the southern counties; such boons as the power-control system which replaced the National Grid in 1963 to ensure that no area in the

country can ever lack atomically generated electricity for as much as a split second; and such *miracles* as——" he paused dramatically "——Men of Metal, Electro-Incorporated's domestic robots! Madam, the day of the perfect servant has dawned!"

"I'm very pleased to hear it," she said, coldly.

"At your service, madam," said the tallest, smiling handsomely, secret laughter in his voice.

Most of it had sailed far over Connie's head. She wasn't Irish enough to believe in leprechauns, but the little people came before robots on her scale of credibility. Then she recalled an ancient film she had seen years and years ago; what was it? "When the World Stood Still," or something like that. There had been a robot in it, and it had scared her out of her wits. Robots! Yes, she had seen references to them somewhere recently. The bruised thumb must have dulled her memory.

She scowled sceptically at the tall fellow, then at the stocky salesman, then again at the tall one who answered her stare with a calm smile. "Look here," she said to the

salesman. "Do you mean to tell me that *he's* a robot?"

"Yes, madam!" He nodded excitedly.

"You're fibbing. Can you prove it?"

"I regret that I cannot——"

"Why not?" Now she'd show him what she thought of salesman's patter. Gypsies with clothes pegs, Indians with silk ties and lucky charms, or English selling Men of Metal—her tactics got rid of them all.

"Because his inside is of too delicate a nature to be exposed without proper protection."

"Well, what of it? So is mine!" Hardly the comment expected of a young lady, but nonetheless effective.

The little man seemed disconcerted. Then he stooped like a folding knife, picked up the dog and cradled it in his arms, without dropping the case or even tangling the lead. It was quite a juggling feat; either he was more gifted than most men, or he'd been doing it for doors and doors.

"You see this dog, madam?" It squirmed round and licked his face. He didn't appear to mind.

"I'd be blind if I didn't,

but carry on." She was shaken by a sudden suspicion as she followed his movements.

"Watch." He pressed its plump stomach; its side slid open, revealing wires and tiny valves and copper-coloured plates; then it closed again. The dog had another dab at the man's pink features. He lowered it to the path and it frisked about his feet.

Connie stood gaping.

"Another sample of our wares, madam; we sell them as pets. Small models like this are not as intricate and sensitive as our Men of Metal, the perfect servants."

"At your service, madam," said the tallest, smiling handsomely, secret laughter in his voice.

"But the principles are the same," continued the stocky man. "Now do you believe me, madam, when I say that humanoid robots can be built and used as servants?"

"Yes, I do," she stated. Her suspicion was growing. But she was flabbergasted. It was such a cute little pup. Then she realised why Patch hadn't gone wild at the presence of another dog. He usually did; he had uncanny awareness of such

things; there were times when she credited him with mystic vision. No wonder he hadn't stirred!

"Our robots," declared the salesman, "suffer no human emotions; no grief, fear, or any of the individual feelings which lower the efficiency of human servants. They have their limited functions, to which they adhere rigidly; there is no room for envy, malice or hatred; they work tirelessly and do not eat; they are obedient and need no sleep. If I release this case with its magnetic controls my influence over my companion will end—he will exist merely to serve you." He smiled the salesman's automatic smile. "Electro-Incorporated is proud to offer him to you at the special price of one thousand pounds."

"*What!*" If he didn't leave soon there'd be a row; that thumb was nagging again.

"Please, madam, do not be alarmed—at this rate Men of Metal are cheap. And, if you wish, you may pay in regular instalments or hire a servant."

"I don't *want* a human robot!" she snorted. The faint suspicion had blossomed

into a certainty. *Cunning so-and-so's!*

"But our robots are virtually indistinguishable from ordinary people. Don't you agree, madam, that my companion could pass for a living man?"

"At your service, madam," said the tallest, smiling handsomely, secret laughter in his voice.

"I do," she admitted truthfully. "But I have work——"

"Ah, madam, let a robot do it for you!"

"For the last time, *NO!*" A wicked glint came into her eyes. She decided to play make-believe until the end. "What if your robot was accidentally or even deliberately broken? Would your employers cause any trouble?"

"Oh, no, no, no, not at all!" He drew himself up in a pompous attitude, dismissing the ridiculous suggestion with a stiff jerk of his head. "Electro-Incorporated Men of Metal, vocal and all but intelligent, inexpensive yet indistinguishable from human beings, strong but obedient, could not be damaged in any normal fashion. Their perfectly-hued rubberoid skin and flesh disguises alloy framing of quite incredible dura-

bility. Think of your own unfortunatemishap, madam—your robot servant should have been doing that job, and Electro-Incorporated Men of Métal cannot be hurt by hammers!” His hard tones chuckled.

Confident in her intuition, astonished by her own clever perception, she snapped: “Tell me another!”—and smashed his head with one tremendous blow.

He slumped drunkenly to the path. The case tumbled from his hand. Blood oozed thickly; a grey and crimson mixture bulged from his shattered skull as he lay there, quivering.

Connie dropped the hammer. Her heart lurched sickly.

The pup licked her ankle and rolled happily on the fresh green lawn.

The stocky man ceased to quiver.

“At your service, madam,”

said the tallest, smiling handsomely, secret laughter in his voice.

“—he behaves rather unnaturally, with almost indetectable jerkiness. You see, Mr. Raynor, this ruse actually increases the customer’s readiness to accept the robot, merely by the slight contrast. It makes the robot even more human to him. This must be done in subtle fashion, of course, without the customer noticing it, which is why Personal Sales Branch is always seeking those who possess acting talent—the right man for the job may be found among such people. Hence our motto. But the acting must be good.”

“Yes,” commented Raynor, drily. “Otherwise the salesman himself might be taken for a clumsy robot.” And, just then, the idea amused him considerably.

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THEY COME FROM OUTER SPACE!

by John Law

METEORS!" SHOUTS THE HERO. "A swarm of meteors, and our spaceship is in their path!" And, dashing to the controls, he pulls levers and twists knobs. The spaceship makes a ninety degree turn, and the cinema audience gasps as the screen shows a view of outer space and a string of incandescent rocks hurtle past with a terrifying roar . . .

The science fiction reader in the audience shifts uneasily and manages a feeble smile. He knows that meteors larger than the size of peas are rare; that some of them follow orbits but not in a path like a railway track; that the tearing friction of air molecules is needed to heat them, no matter how fast they are travelling, and as for sound in empty space . . .! Hollywood science provides a cheap thrill by showing the scientifically impossible, and the only consolation for the knowledgeable picture-goer is that the existence of meteors (and meteorites, the remains of meteors that reach the ground without being entirely burnt away) is being gently brought home to the general public.

This may not appear a very practical piece of instruction. Why should the knowledge that "shooting stars" and "falling stars" are

small pieces of rock and iron from outer space be of any more use to the non-scientist than, say, a knowledge of Bode's law or Laplace's nebular hypothesis? Spaceship designers may have to take precautions against the cosmic gravel that floats between the worlds, but spaceship designers are scarce. Ask Joe Smith around the corner what he thinks about meteorites and he'll probably ask in what division they're playing.

The Siberian meteorite of 1908 fell into uninhabited forest country, blowing down and charring pine trees for a twenty-mile radius, registering on seismographs all over Europe, and according to one report, causing the engineer of the Trans-Siberian express to stop the train because of the earth tremors following the tremendous impact 400 miles away! If a similar



mass, a white-hot rock several hundred yards in diameter falling at many miles a second, landed in Britain or in any thickly inhabited part of continental Europe, America or Russia, the death roll from blast and fire would be trebled through sheer panic amongst the immediate survivors.

And thus would start "Atomigeddon," and by a cosmic irony a rock from space would probably reduce civilised man to a rock-hurling savage again. Or as Einstein put it: "The fourth world war will be fought with clubs."

Given the initial catastrophe the rest has a good chance of happening, so what are the chances of sizeable meteorites hitting the Earth? We don't know how many are drifting in space. We can only hazard a guess on the evidence of those that have already struck the planet. Meteor Crater in Arizona is the outstanding piece of evidence—nearly a mile across and 600 feet deep—and there are other, smaller craters in Western Australia, Canada, on a small Baltic island, etc. But how many iron meteorites have rusted away, how many have disappeared in the depths of the ocean or under soft earth or have only left a trace in the form of a suspiciously round lake?

In the middle ages, the idea that the heavens could hold such small pieces of matter in addition to stars, planets and moons was thought impossible, although the fall of a stone weighing 260 lbs., in 1492, so impressed the Emperor Maximilian of France that he had a remarkably detailed account recorded; how a child saw it fall into a field, how it was dug up and placed in a church, etc. The strange circumstances attending any fall usually resulted in a remarkably confused story from any spectators, however. One witness of an Indian meteorite, a Hindu, alleged that it had hunted him through the jungle for two hours!

In 1792 a committee of scientists was appointed by the French Academy to investigate the fall of some stones at

Luce. They investigated, and "proved" that the stones, which showed signs of fusion, had been lying on the ground all the time, and had been struck by lightning . . .

It wasn't until 1794 that the German philosopher, Ernst Chladni (who, incidentally, founded the science of acoustics), brought forward such a mass of evidence regarding an iron meteorite found in Siberia, and backed it up with such an excellent scientific reputation, that the scientific world of the day was forced to re-examine its evidence.

This evidence included not only the Chladni meteorite but a 56 lbs. stone seen to fall at Wold Cottage, Yorkshire, by several witnesses. With interest roused, records were kept. Between 1790 and 1815 ten showers of meteorites were reported from France alone, including one in 1803 that scattered 2,000 fragments over a wide area. This last incident was visited by the physicist, Biot, and his favourable opinion on its authenticity removed the last doubts from the minds of the obstinate . . . or the cynical.

The actual place of origin of meteorites was by no means settled; as early as 1660 it had been suggested that if stones did fall to Earth, it was because they were projected from volcanoes on the Moon, and as late as 1900 well-known astronomers were willing to argue that meteoric material might originally have been ejected into space by Terrestrial volcanoes. It is now accepted that meteors are actually cosmic debris; parts of comets, pieces of matter that never agglomerated when the planets were formed, perhaps pieces of the hypothetical exploded planet between Mars and Jupiter, perhaps visitors from interstellar space.

Since the 1800's museums all over the world have accumulated meteoric specimens, and occasionally they have been front-page news. Siberia seems to be a regular target; in addition to the two mentioned, there is a third famous meteorite recorded. In 1947 a thousand-ton rock plunged to earth at eight miles

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In Africa, as here, you never can tell what children may get up to!

Down to Earth

by JOHN KIPPAX

AS THEY TRAVELLED ALONG the smooth highway to Nairobi, George was still griping.

"Where the hell do we go from here?" he wanted to know. "There's not a criminal in the province with anything remotely to do with the IPS. There's not a soul seen a rocket come down and just to make it interesting, the three they sent over as bait stayed on course as steady as a rock."

Hassall, plump and balding, looked out into the tropic night and sighed. His fine head of skin contrasted strongly with George Chaffee's red mop and Dennison's black one. In imitation of their well-hated chief, he said: "This will be another opportunity for P. P. Matthews to say that we 'seem to have failed'." He spat symbolically.

"The interesting thing," put in Dennison, thoughtfully, "is that there seems to be no plan or pattern about the way these rockets go. The International Postal Service doesn't seem to have any enemies, I mean. If it hadn't been for the fact that the last mail rocket they got had in it those details of what would have been a highly unpopular population shift—woa!"

His exclamation was caused by Hassall jamming on the brakes. But they were too late. The broken glass scattered all over the road was under their wheels before they could stop. They drew up.

"Good thing we've got self-sealers on all four," remarked Hassall. "Come on, let's be good citizens and clear that lot off." He took a torch from his pocket and

they went back twenty yards to the dangerous scraps on the firm surface.

"This was deliberate," said Dennison. "I don't need my Fedpol training to see that. Look how it's put down—an even belt, right across the way." He picked up some more and flung it at a bush.

"Tell you something else," said Hassall, "the guy who did it was a teetotaller—they're all Sola-Cola bottles."

George was sucking his finger where a chip had nicked him—ordinarily good humoured, he was so fed up that the pleasantries of his friends annoyed him. A conscientious fellow, he found himself raging more and more about the way in which he had been sent out here to do a job which was reasonably beyond him. He was a rocket engineer, not a detective—blast P. P. Matthews!

"Turn it in," he said, sourly. "Dennison's the 'tec here."

"Not according to *Mister* Matthews."

"Gaaaah!" snarled George.

"Hassall could be right,"

reflected Dennison, "or it could be some kid with a perverted sense of humour."

The language expert turned his back to the strong westerly breeze and tried to light a cigarette. In doing so, he glanced at the car. He stared in horror at the neat little vehicle, and the match burned his fingers before he dropped it. Hassall and Chaffee followed his petrified gaze, and they, too, stood rigid in stomach-tight unbelief. The car seemed to be going dimmer, and its lights were gradually losing their radiance. The thing seemed to lose definition, to dislimn, and what colour the bright moonlight permitted them to see was seeping away.

Chaffee took a couple of steps forward, but Dennison grabbed him. "Still, George—or it may get you, too!"

Soon the outlines of the car were almost invisible, and the machine was just a box-like wraith—then it became part of the moonlight—and was no more. In the shocked silence which followed Hassall made a sound something like "glug"

and Chaffee stared with a blank and rather frightened incomprehension. But Dennison seemed delighted.

"Well, *well!*" he chuckled, "that's the first good clue we've had!"

This was beyond Chaffee: he liked the routine of his daily job, the bustle of clean and smokeless London; he did *not* go for disappearing acts done in the middle of moonlit African roads. But if Dennison thought—

"Don't you *see?* Witch doctor stuff—and a pretty unskilled witch doctor at that!"

They walked to where the car had been, but now most certainly was not.

"How come, unskilled?" Hassall wanted to know. "Any witch doctor who makes a car vanish right before my eyes is tops in his line, as far as I'm concerned. Come on, let's quick march back to the bungalow and we'll 'phone from there."

Dennison disagreed.

"Let's sit on it for a day or so. That was telekinesis, and we don't want to spoil the

trail. Maybe the person responsible was not more than a hundred yards away when it happened."

George stopped. "Then why don't we go after him?"

"Because," answered Dennison, as he urged Chaffee to continue walking, "with such as they, it's softly catchee monkee."

"Know a lot about it, Den?" said Hassall.

"I'm practically African by adoption," was the reply. "I'm pretty sure that we've run across a powerful but unskilled—or better—an *unintelligent* operator. Someone who has found he can do this, but doesn't know how or why, with no evil intent at all. Maybe it's just for his private amusement."

George grunted and said: "Fine sort of amusement." He was seething at the thought of yet another report to send out. He thought that when P. P. Matthews received this one (in quintruplicate, of course), the admin man would probably snort out something about "going native." The world for this little white chief

was as complicated as it was infinitely small. Then Chaffee withdrew from his grisly musings, put two and two together and made a reasonable four.

"See, Den, as we've already been round all the adults in the district, that only leaves the kids, doesn't it?"

"Schools, hospitals, clinics and crèches next," said Dennison, cheerfully. "We can save a lot of bother if we send a message to Nairobi for general distribution throughout the area, and when they've done some winnowing we can get going with Superintendent Kabi and his stooges."

The lights of the bungalow could be seen in the distance. Hassall puffed thankfully, and George found himself agreeing with the older man that when he got the report on this the great P. P. Matthews would surely say that they had "seemed to have failed" again. He gritted his teeth at the awful clarity of the sound picture which came to his mind of Matthews using that phrase.

"Eh?" asked Dennison.

"Eh what?"

"You just growled like a dog."

"It's a fairly free country here," said Chaffee snappily.

Chaffee spent a restless night. He dreamed—among other things—that he was back in London, working under the heel of the bump-tious, egotistical, favour-currying, loud-mouthed lick-spittle who was P. P. Matthews. This character had, somehow, got the job of maintenance supervisor at the London depot of the International Postal Service—security rocket section.

He was no technician, but despite the fact that he knew that those under him knew it, he did his grimly laughable best at pretending. He was hot on files, he wrote a crafty minute, and with his fat backside he warmed the padded supervisory chair with the greatest possible aplomb. He had influence, obviously—that was all he *did* have. The most charitable thing that was ever said about him was that maybe he was wearing somebody else's head. He showed his idiocy in admin

matters when he had insisted that the missing rockets were an IPS affair, and he had detailed George Chaffee—a good tech, but no 'tec—to go with Hassall and clear up the matter. Since then he had harried them by cable and 'phone, had demanded *full* reports on everything and nothing, and by his persistent badgering he had made their lives intolerable.

George was saying: "Mr. Matthews, the rockets are completely controlled throughout their entire flight, which is at an average speed of four thousand miles an hour—if they come down, do I track them with a forked twig and a couple of incantations? How the hell am I how the hell am I how the hell——"

"Tea, Mr. Chaffee, sah." The houseboy shook him awake. Sweating, George growled his thanks and took the cup.

The end of the first day's enquiries on the new line showed no result. They went into Nairobi in the evening, where they endured with faces as straight as possible the tale

of woe told by Superintendent Kabi, who had been snowed under all that day with useless information from all quarters. They went to see a show after they had dined. In the bar at interval time they were approached by a tall African. He greeted Dennison, who returned the salutation with enthusiasm.

"Mr. Umbara, meet Mr. Hassall and Mr. Chaffee."

They shook hands—they had heard before of this etymologist acquaintance of Dennison's, one of the many hardworking schoolmasters in the district.

Umbara said: "They told me at your bungalow that you would be here. I wanted to deliver this personally."

He placed in Chaffee's hand a round shiny piece of metal. It was the hub cap from the wheel of a car, and of the same make as the one which had dematerialised so sensationally on the Nairobi road.

"When classes were ended for the day," he explained, "I saw two boys who had stayed behind in the playground

pitching this thing backwards and forwards. When I questioned them they were very reluctant to tell me anything. Then one used a phrase which means, in English, 'the crazy wizard,' and then I thought that I knew who they meant. There is one boy who comes to my school who is a very difficult type. There are times when he seems almost mentally deficient, and he is much away from school. The boys tend to make fun of him, and there is no special school near here where he could be sent. His parents spoil him, I'm afraid. He has been absent three days this week. Here is his address."

Dennison took the paper.

"Billy Pado, son of James and Ellen Pado, Highborn Farm, Road 14, Route 3, Nairobi."

"Looks hopeful," said Hassall.

It still looked hopeful the next morning. Dennison was humming a little tune as they sped along to the road junction to join forces with the superintendent, a doctor and a policeman.

"How do you feel?" asked Dennison, cheerfully.

"How am I supposed to feel?" replied Chaffee. "Sooner we get this magician cornered the better."

He was not feeling very happy. Another confounded questionnaire had arrived from Matthews that morning, together with a sweet little note which reminded Chaffee of the expenses of his "fruitless" trip. He "seemed to have failed . . ."

"You *should* be feeling darned nervous," said Dennison seriously. "If you frighten this telekinetic, who is as powerful as he is irresponsible, he might decide to wish you somewhere else. That might be inconvenient, to say the least."

"So," put in Hassall, "what do we do when we find him?"

Dennison wagged his head at the approaching road junction. "There's the super and his doc."

They drew up and exchanged greetings with Kabi and the doctor. The police officer grunted when he saw the address.

"A bumpy journey ahead," he murmured. "These farm roads are a disgrace."

Dennison spoke casually to the constable-driver in the local tongue. "Do you know the farm of Mr. Pado?"

The effect of this simple question on the man was remarkable. He laid back his ears in fright, rolled his eyes and gulped. "We go there, sir?"

"Certainly we go there," snapped Kabi. "Why not?"

"Nothing, sir," replied the constable. "—I have my pistol."

The glances which flickered over the ebony faces showed the three whites that perhaps the old Africa was not quite so dead as some would have had them believe.

As they had travelled up the dusty track there had been no sound from the fields save the hum of insects and the distant thudding of an irrigation pump. Now, as they reached and passed through the farm barrier, a man came out towards them. He was a tall African, clad in khaki

shirt and trousers and rope-soled shoes. His swift appearance suggested to George that he had been observing their progress towards the farm. His manner was cautious.

"Mr. Pado?" asked Dennison, politely.

"I am James Pado," answered the other. "What do you want?"

Kabi performed the introductions, and then said: "May we come into your house? The matter concerns your wife, too."

Pado motioned them to enter. It was cool under the heavy thatch of the farmhouse. Pado called his wife, a sturdy woman of about thirty who favoured bright colours, and asked her to bring some water. She brought a pitcher and glasses, and remained at Chaffee's request. Matthews, he thought grimly, here we go again!

"We need your help," he began, "in what may prove to be a vitally important matter. First tell me, where is your son at this moment?"

Dennison was doing most of the interpreting—some-

times Kabi and Doctor Valentine joined in. The farmer and his wife answered readily.

"Somewhere up in the scrub, I think, where it is not yet clear land. When he is not well and has the clouds in his eyes, he will do nothing for us, but he goes up into the scrub."

"Is he a good boy?"

"Except when he has the clouds in his eyes."

They had a little trouble over that phrase. His mother explained.

"It is as though not all of him were with us. If we send him to school like that, the other children make fun of him, and we do not want to lose him because he is different—unlike ordinary children. Sometimes when he is like this he stays away for long times. The night before last he was not home until—very late."

Pado said: "Once I followed him to the part of the scrub which he calls his 'kingdom.' He turned on me in a mad rage and said that if I ever followed him again he would wish me away——"

That brought Chaffee and Dennison to their feet.

"*He said that he would wish you away——?*"

"Yes."

Mrs. Pado began to sob.

"I knew that he would have to be taken away—I knew——"

Valentine comforted her. "Listen, Mrs. Pado. We think that we can help you. If we are right we can take your boy away to London, where the finest surgeons in the world can operate, and where he can be looked after until we can return him to you as a normal healthy boy, with no sudden tempers and no clouds in his eyes. Take an African's word for it that we *do* understand——"

Then he and Dennison told them enough of the story, and when they had finished, Pado spoke.

"Maybe," he said, "if I lead you to the 'kingdom' we can see if we can approach him. It will help if I can look through your far-seeing glasses."

The white men agreed, but Pado said: "We are too

many." So it was agreed that only Chaffee, Dennison and the doctor should go with Pado. The farmer stroked his wife's face and said: "It is for the best. No tears, Ellen."

They left the farmhouse and took a rising track which led to the upper part of the farmland, that which awaited clearing and resoiling. They sweated on until they came to a bend in the track where the giant thorns gave some shade. Pado halted.

"If you give me your glasses I will go forward alone."

The superintendent handed over his binoculars, and Chaffee asked a question through Dennison.

"Have you ever seen the boy with anything that did not seem to belong to him?"

"Like what?"

"I mean, has he ever brought home things——?"

Pado answered with dignity: "I do not think that my son is a thief."

"No, no, of course not," the doctor put in hurriedly. "See if he is doing anything

unusual when you first spot him."

Pado nodded, and George Chaffee saw him creep forward to where he could see into the grove of trees. He wondered what P. P. Matthews would have done out here with this situation—a real jungle exchanged for his beloved paper one. It was easy to see that Pado was an intelligent man who suspected that there was more in this than his visitors had deigned to tell him. If he would agree to what these men proposed, then little Billy might be cured, and then he and Hassall and Dennison could get home to their wives and families and their work—with bosses like Matthews. How many men had bosses like Matthews? he asked himself. You heard of wives murdering husbands, and husbands axing wives, but bosses——?

They smoked and waited, brushing away the tiny sweat bees which pried about their faces in search of the minutest drop of moisture. There was the noise of the insects, the rustle of grasses bending in

the heat, and the irrigation pumps going throb and throb again, heartbeats of the life of the region. Then they saw Pado returning—he was excited, and he ran the last few yards.

"I think it will be well," he panted. "The clouds are gone from him, and he is all himself again." He hesitated. "I also caught a glimpse of strange things there—like old-time war drum logs. If it is anything he has taken——"

Dennison translated George's assurances.

"Don't worry, Mr. Pado. Your son can fool you any time he wants, even if he's not smart enough to know why he does it. Lead on."

Pado went first, followed by George, then Dennison and the doctor. The breeze brought to them the sound of a childish voice, raised in the improvised song which Africans love. From the grove which Billy Pado called his "kingdom" there came too a flashing, rather like a heliograph.

They approached cautiously.

"What's he singing?" asked George.

Dennison translated: "Here am I free with my treasures of the sun's making—here am I safe with my roadgoer new."

They walked up to the little black boy who was in the glade. He was moving the mirror of the car which stood by his side, watching the disc of light leap about on the dark leaves. He stood on an IPS security mail rocket. There were others nearby. He looked up and smiled at his father, and when he saw the others he showed no fear. Pado, his eyes roving in wonder over the rockets and the car, said, gently: "Billy, here are some kind gentlemen come to see you. They are great friends of your mother and I, so listen to them carefully."

They approached softly, almost reverently.

"Hallo, Billy," said George kindly, "we're *so* glad to have found you."

"Well, Billy," said Dennison, "you like the big aeroplane now?"

The youngster nodded, and

Dennison translated the question to George.

"So he should," growled Chaffee. He was in an ill temper through another screaming missive from P. P. Matthews, received just before they left Nairobi. "He should be, too! All that kid glove stuff with his parents when we could have legally insisted that the boy have an operation for his complaint."

Dennison was reproachful. "It's a gift."

Hassall's high voice came easily over the thrum of the motors. "Still too dangerous for a boy like that to have. Heaven knows what he might wish for next! He could wreck the world. How long does that drug last on him?"

Billy Pado sat drowsily with a picture book on his knee, sucking a sweet and smiling vacantly. He did not look like a world wrecker. He understood vaguely that these men thought highly of him, that he was to go on this wonderful trip with them, and to see wonderful sights, and then to return to his father and mother. George

wished that he could have spoken directly to the boy, for Billy was obviously fond of Dennison.

"Doc said it would last five hours," said Chaffee, "and that should give us plenty of time to get him wheeled straight out of the airport, into the ambulance and to hospital."

"And an hour after that," said Hassall, "we needn't tremble any more."

Chaffee said, cynically: "Guess P. P. will be hopping mad about this. He won't know what to file it under." He laughed mirthlessly.

"Be just like the officious little bellyacher to meet us at the airport," said Hassall.

Chaffee did not reply—his mind was full of what was to come. He had cursed often enough at the months they had spent in Africa, but now that it was over, there came to him the oppressive realisation that he would once more be under the blighting influence of the super bureaucrat, the fawner on authority and the embodiment of re-

actionary ignorance, P. P. Matthews.

"It seems to me that you have failed in that . . ."

The hell with it, he thought, the hell with it, and with his mind rumbling away at the helplessly defiant phrase, he dozed off fitfully, and did not wake until the 'plane was coming in to land. When he woke it was to the reluctant admission that they were now in London again, and that there would be work again tomorrow, and Matthews . . .

They were right on time. George Chaffee looked out of a port with sleep-dulled eyes and saw a sight that was just too much for him. Beyond the barrier, a car painted flaming orange leaped to his gaze, and in it was . . . yes, there was no mistaking that pudgy figure, that owl-like stare . . . P. P. Matthews!

He tore his mind away from the dreadful sight of the obese little dictator, feeling as

though he would burst. Then his mind was distracted from what he was about to say by the sight of young Billy charging up and down the aisle. The effects of the drug had apparently worn off. Dennison gave Chaffee a wary sidelong glance. There had been a miscalculation, it seemed.

"Chirpy, ain't he? We'll have to watch it for a while until we get him safe on that white table."

George looked at the little curly head that contained the dangerous power which would soon be cut out for ever. He looked out of the port again. His face was set.

"Listen, Den," he said, speaking rapidly, "the kid likes you—he does as you tell him. Listen, Den, I wouldn't want anyone hurt, but when we're out and pass over by that bright orange car, could you ask him to do something for me? Listen, Den . . ."

When it comes to piloting spaceships—

Why not a WOMAN?

asks Kathleen Downe

THERE IS NO REASON WHY A woman should not be the first person to pilot a spaceship!

The emancipation of women is far from complete, but bearing in mind the great strides which have been made along this path in the past fifty years the next fifty will see even greater changes. As our standards of living rise, those women who show marked intellectual acumen will have more opportunity to continue their valuable work, for really good brains will be needed more and more, and the world will soon realise that it doesn't matter two hoots whether the brain has a male or female body. That is, unless the brain is needed to pilot a spaceship.

This will be one time when weight will be a very important consideration. Of two brains of equal keenness, that of the woman will give the best power-weight ratio.

A lighter body means less food, less oxygen, less room to move in, so that the overall advantage would be considerable.

Excessive physical strength would not necessarily be a prerequisite for a space pilot, but quick reaction time, high powers of physical endurance and brilliant intelligence will be essential.

The hardest part of the pilot's flight from a physical point of view would be the strain of acceleration during take-off. This strain has been grossly exaggerated in the past. It is only in the initial stages that a fairly high acceleration would be required, perhaps as much as three *g*'s in a course in which the ship rose vertically for the first fifty miles, then turned eastward and continued in a horizontal direction until escape velocity had been reached.

On this principle, it has been calculated that the pilot of a spaceship would feel four times his—or her—own weight, as gravity is adding its own force. This four *g* drag would only be felt for about a couple of minutes.

Raising an arm from the lying prone position under four gravities would require about as much strength as is required to lift 10 lbs. of potatoes, a load of washing—or the baby—as very many women do in everyday life.

Most science fiction films and stories tend to dramatise the strain of reaching controls during take-off. Much of the difficulty is enhanced by bad layout of the controls on the screen set. In reality, scientists will, of course, place the controls in the most easily accessible position, and any necessary arm raising will be assisted by the use of counter-balancing mechanisms. Further to outdate popular misconceptions, it is already current practice for guided missiles to be operated by remote control during take-off, so that the pilot would have nothing to do until after the ascent.

However, should physical strength be needed, a woman could meet the requirements of a spaceship crew member. It is not so very long ago that women were driving three-ton lorries and firing heavy guns. It is as well to remember that, unlike men, women have not been trained to increase their muscular strength, and expert training would increase their capabilities in this direction. Of all the qualities which a space pilot must possess, physical strength will be one of the least important.

A woman does possess the essential qualifications. The Second World

War showed them every bit as capable as men at manipulating delicate scientific instruments, and, when it comes to precision work, they are in many cases superior to men. By that peculiar quirk of nature commonly known as "intuition" they have been known to arrive at the solution to some problem which has been baffling a man.

Their quick reaction would be in-

valuable in the handling of a spaceship, as would their greater ability to stand up to prolonged strain and tension.

It is a well-known fact that women can stand far more severe pain for longer periods than men, and through the ages they have shown courage, resourcefulness and determination, and these would be essential qualities in the event of any emergency during

the flight. Their fortitude is perhaps more striking since it is generally not, as is often the case with men, occasioned by discipline and military training. With such an important and vital task to do these qualities would become even more pronounced.

A woman does not give up hope easily and, provided she is properly trained, she is not likely to be beaten by a problem.

It was Madame Curie who kept on when Pierre would have given in, and after his death she still held on with her work and research until her own death.

In any event, if man is to conquer the stars, woman must accompany him one day. Is it uncharitable to suppose that only his desire to win the glory for himself, covered by an excuse that it is "too dangerous a task for a woman," will prevent a woman being on the first ship?

Women, being the perverse creatures they are, will twist their menfolk round their little fingers so that when the time comes for the first piloted ship to blast off, if the person with the right brain and the right weight, possessing all the other necessary qualities, happens to be a woman, then a woman will be the first "man on the moon!"

The idea is, after all, not so very far-fetched!



Gravity-strings and Saucers

W. W. BYFORD, B.Sc.

IN CONSIDERING MOTION IN spaceships we are naturally much troubled about the problem of the effect of rapid acceleration or slowing down (negative acceleration) on the human body. A recent experiment in the United States with a rapidly halted vehicle resulted in two black eyes for the driver. His eyeballs are said to have continued moving forward to bruise his eyelids. X-ray photographs have been taken of a man submitted to large accelerations to show that various parts of his skeleton were actually stretched in the process. Anything which can alleviate the position of a passenger under rapid acceleration is obviously very much to be desired.

Can we in any way make use of the principle of inertia to this end? Suppose that the passenger is sitting on a seat

mounted on a rail which runs the length of the ship and that the seat can slide freely along the rail. Now suppose the ship to accelerate suddenly with the seat at the forward end of the rail. The passenger does not receive the acceleration of the ship because his seat slides along the rail. However, what happens when his seat gets to the back end of the rail? He hits whatever is there to stop him leaving the ship altogether with a velocity equal to the increase in speed made by the ship during its acceleration. That would be more damaging to his person than would have been the acceleration. Suppose, however, that his approach to the back end had been cushioned by oil buffers such as are used at railway termini or to deal with heavy gun recoil. His velocity at the end

of the cushioning would be equal to the velocity of the ship. In other words he would have acquired the new velocity in the time it took the buffers to submit to compression. If the ship had meanwhile ceased to accelerate, and if the buffers had been sufficiently long and had compressed slowly enough he might indeed have been spared several *g*'s acceleration.

Now, if you are mathematically minded, get a pencil and paper and apply the established formulæ connecting distance travelled in a given time at a given acceleration from a given initial velocity. Assume that you have a Queen Mary of a spaceship and make your rail a thousand feet long. Let your spaceship speed up from ten thousand miles per hour to eleven thousand miles per hour in ten seconds. Now assume that during that ten seconds the seat has moved the whole length of the rail. The passenger at the end of the ten seconds will have the same velocity as the ship unless he is going through the back of it. He will thus have had the same average acceleration as he would have had if his seat had been fixed, and so nothing will have been gained.

But suppose that when the ship ceased to accelerate the seat had moved only five hundred feet along the rail and continued to move the other five hundred feet in twenty seconds, then the passenger will have taken thirty seconds to acquire the acceleration made by the ship in ten seconds. Of course, if the ship were travelling on a normal course it might just as well have taken thirty seconds instead of ten to make the same increase in velocity, but occasions may arise in which sudden bursts of acceleration could be desirable.

GRAVITY-STRINGS

Let us suppose that the passengers are housed in a cabin attached to the power units by a steel hawser reeled like a fishing line so that it can easily be run out. Now when the ship accelerates the cabin is left trailing behind in space. When the reel is quite run out there will be one devil of a jerk on the line. But now suppose that as the line unrolls, the turning of the reel is made to wind a giant spring. Then as the cabin is left behind it will nevertheless be acquiring some of the

acceleration of the ship all the time and the tightening of the spring will bring it gently to the end of the line. If, before the unreeling is complete, the acceleration of the ship has stopped, then again we shall have succeeded in spreading the acceleration of the passengers over a longer time. The spring on the reel can now unwind to bring the cabin back into position in the hull of the vessel. Such a gravity-string might be several miles in length and make considerable modification in the acceleration actually endured by passengers.

SERIOUS OBJECTIONS

There are, of course, many obvious objections to the devices suggested. There is the one that comes immediately to mind when we consider the essential weightiness of the mechanisms involved. The moving crew will want still further special apparatus if they are going to have control over the ship. The air supply and temperature control necessary for the comfort of the passengers will raise further problems. As I have said in earlier articles I do not claim to be able to give a blue-print for space travel

today or even tomorrow, but every tomorrow brings us new knowledge and new materials to make possible the application of the fundamental principles which determine the behaviour of all matter.

The effect of acceleration can be harmful not only to the human body. At one time attempts were made to make two powerful aeroplane engines in tandem operate one propellor on an aircraft in order to give a small fighter 'plane high velocity and unusual powers of acceleration. The technical difficulties were overcome, but it was found that unless almost the entire structure of the aircraft were made very much stronger, the power unit tore itself out of the hull. The extra weight necessary nullified the gains made. What was happening, of course, was due to the inertia of the aircraft in the face of such acceleration.

Now if we assume that our spaceship is driven by a jet situated aft, unless every structure in front of the power unit is heavily strutted, when large acceleration is applied by the jet the vessel will collapse concertina fashion. In any case there will be heavy strains on rivets, bolts,

welds or any other bonding devices. In the case of an aircraft we can gain by using several engines spaced to spread the motive power. Can we do the same thing with our space vessel?

Thinking along these lines I first thought of a flattish triangular vessel moving base foremost with the apex of the triangle coming up behind. The jets could then be spaced along the two rearward sides of the triangle. In this case, however, the leverage imposed by the outermost jets on the leading edge would bring about a very great strain on the structures composing it. The same objection would apply if the triangle were made to move apex foremost like a delta wing aircraft, and there would be the additional disadvantage of having all the jets along one line, leaving a large area in front of it to be strutted against inertia. The next shape to come to my mind was a crescent. This would have the strength of an arch. At no point would there be any great length in front of a jet.

Then I began to wonder whether the crescent need be flat, and if not, how thick it might be. If it were made too thick the ceiling and floor

would be so far from the driving units that their inertia would again become effective. Then I wondered whether several lines of jets could be used so that the vessel, while having a crescent shaped cross section, could be quite tall. We should now, however, have vertical lines to which considerable drive was applied by several jets, and each one of these lines would need to be heavily fortified. In endeavouring to improve on this model I hit upon the idea of arranging to have a crescent cross-section in any plane containing the line given by the direction of the drive. Well, what had I made in my imagination? A SAUCER!

Besides the perils to personnel and hazards of the hull involved in violent accelerations of our space craft, there is yet another potential source of tribulation. There will be aboard a variety of sensitive instruments. As was pointed out previously in *Authentic*, we ultimately measure all things by measurements of length. Necessarily, all these instruments are equipped with moving parts, and delicately poised moving parts, to ensure sensitivity and accuracy. Each swinging needle or rotating coil will

have its own inertia. Every finely ground precision bearing will be endangered.

Apart from measuring instruments there will be control devices with narrow tolerances. These, too, will depend for their efficiency on little moving parts. Thermostats, switch gear, air-conditioning apparatus, refrigeration units, etc., will all be liable to go completely haywire as a result of experiencing too many g 's. Consider, also, the possible effects on such things as ball valves. We begin to see that a tremendous amount of preliminary precision engineering research will have to be done before devising modifications of all the gadgets which have been developed to function efficiently on Earth.

There is yet another inertia problem on the large scale. A considerable bulk storage

will be necessary in a spaceship of various liquids. A considerable weight of water will certainly have to be stored somewhere, and water is notoriously hard to compress. There will probably be liquid fuels, lubricants, and quite possibly liquid air to be carried. The storage holds could, of course, be divided into many small interstices by perforated baffle plates and doubtless new light laminated materials will be available for the purpose, so that although the consequences of negligence would be serious in this case, a remedy is perhaps not so difficult to foresee. Of course, we could put measuring instruments, control devices, liquid storage and all manner of other objects on gravity-strings so that a space vessel during acceleration would be trailing so much that it would resemble a shrew mouse with the tail of a circus pony!

PARRY'S PARADOX

by Lyn Venable

IN THE YEAR 2169 A.D., DR. BRUNO Leib invented an apparatus which was glibly referred to in the Sunday supplements as a time machine. The technical aspects of it were very complicated, having to do with the creation of an extra-temporal field, a field of force existing outside of normal space-time. The workings of this field were clear only to Dr. Leib and a few of his calibre, but the important fact, the fact that everybody understood, was that it worked.

Everyone was pleased. An illustrated magazine ran a picture article showing Dr. Leib placing two little white mice into the chamber of the working model of his time machine. The next picture showed Dr. Leib doing something with switches and studs and levers; the final picture showed the chamber empty.

The final picture which should have showed the two little mice back safe and sound was missing, non-existent. That was the rub. Dr. Leib had no trouble at all sending the creatures back in time, but reappear in the present they did not, although, according to his calculations, he'd only sent them back forty minutes.

"Time is full of paradoxes," said Dr. Leib to a newspaper interviewer.

"Maybe the mice are always forty minutes behind you," suggested the interviewer, helpfully. "Maybe if you had looked in the chamber forty minutes *before* the experiment they would have been there."

"Then," replied Leib, acidly, "being unable to get out of the chamber, they'd still be there. At any rate, I did look and they weren't there." The reporter left, shaking his head.

"If only I had an intelligent subject!" the newspaper quoted Dr. Leib. "Perhaps the animals are being forcibly removed from the chamber in another time. Although the locks are un-

damaged in our time. Perhaps they are going much further back than my calculations account for. You know, time is full of paradoxes. Now if a man were to—but of course at this stage a man might possibly find a way to return, or send a message." The newspaper laughingly headed the article with the question "Any Volunteers?" They didn't count on Bonner Parry.

Bonner Parry was not an especially brave man, but he was willing to take a calculated risk for a fee. The fee in this case was ten thousand pounds, not, strangely enough, in coin of the realm, or rather the inflated paper currency which represented coin of the realm, but precious gems instead.

Dr. Leib listened to Mr. Parry with the utmost fascination. The young man was passably dressed, a little in need of a shave, and smoking a cigarette in an oversized holder which he waved in the doctor's face as he spoke.

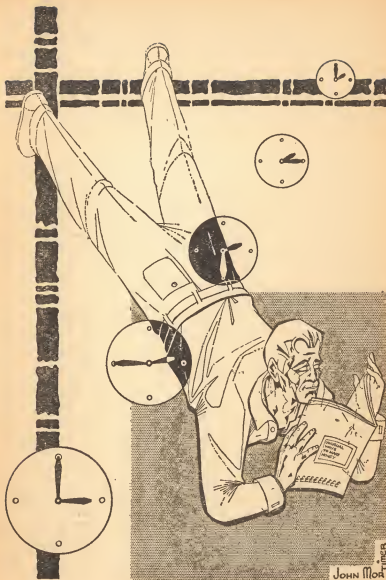
"So my only stipulation is this," He pointed his cigarette dangerously close to the tip of Dr. Leib's nose. "I get paid *before* the experiment, not after. I want to take the jewels into the gadget with me. Then, if I get stuck in some other time I've got something I can convert into whatever they use for money. I think small ones would be best, worth, say, between three and five hundred pounds each. Larger ones might be too hard to sell."

The doctor nodded weakly. The young man rose, extended a firm hand and smiled genially. "All set then?"

Dr. Leib was perspiring. "Well, I—I—haven't that much money. I'll have to see if I can raise it."

Mr. Parry was agreeable. "Okay, Doc, see what you can do and I'll give you a ring sometime tomorrow."

James Barrison, of Barrison and Kirby, jewellers, listened to his good friend's story sympathetically. "All



right, Bruno, I'll let you have the ten thousand pounds in small gems. If the experiment is successful you won't have any trouble paying me back. Besides, I've always wanted to contribute to something really important. This may be it."

"Jim, I don't know how to th . . ."

"Wait a minute, Bruno, did you think of this? What if this man deliberately gets himself lost? Maybe he's a criminal of some sort trying to escape. Better have the police check him for you."

They did. Bonner Parry had a clean slate. He appeared to be just an iron-nerved young man willing to take a risk for a fee, and since Leib knew that the only way of discovering the hidden flaw in his machine was to get a first-hand report from an intelligent subject, and since his friend, James Barrison, was willing to lend £10,000 to the cause of science, and since Bonner Parry was willing to be a £10,000 guinea-pig, nothing remained to be done except the construction of a chamber large enough to accommodate Mr. Parry's considerable bulk. When this was done, they were ready.

The big day arrived. The magazine people, a contingent from the government, a horde of newspaper people and a few friends crowded into Dr. Leib's modest laboratory, hours before the time scheduled for the experiment. A few curious bystanders dotted the lawn outside.

An hour before experiment time, one of the principals was conspicuous by his absence—Bonner Parry. At that moment, Mr. Parry was lying across his bed reading a magazine titled *UNUSUAL WAYS TO MAKE MONEY*. Five minutes later he glanced at his watch, laid the magazine aside, buttoned his shirt and put on a necktie. He got into his car and started driving in the general direction of Dr. Leib's laboratory. On the way he stopped at a drive-in restaurant and had a sandwich and coffee in his car.

At experiment time minus five, Bonner Parry arrived at the lab. He shook

hands with the doctor, with some of the reporters and with James Barrison. Mr. Barrison took a rectangular velvet box from his inside coat pocket and handed it to Mr. Parry. The latter snapped open the lid, whistled approvingly at the gleaming array of bright stones before him, snapped the box shut and put it in his pocket.

As though at a given signal, a hush fell over the room. Dr. Leib turned to the spectators. "I will now set the field for one hour." He motioned toward his subject. "Mr. Parry, if you will kindly step into the chamber."

Bonner Parry strode confidently to the metal door, paused dramatically for a moment to flash a toothpaste ad smile at the photographers and stepped into Dr. Leib's machine. The metal door clanged shut behind him. Dr. Leib did something with his levers, knobs, switches and buttons. There was a very faint humming sound in the room. Someone coughed; there was a general shuffling of feet. A red light began to glow faintly.

Bonner Parry was lying across his bed reading a magazine called *UNUSUAL WAYS TO MAKE MONEY*. He glanced at his watch. It was an hour before experiment time. He buttoned his shirt and put on a necktie. Five minutes later he was in his car, driving toward the laboratory. On the way he stopped for a sandwich and coffee.

At five minutes to three he arrived at the lab, where he received ten thousand pounds worth of jewels from James Barrison, posed for the photographers, and at exactly three o'clock stepped into the machine.

At midnight that night a perspiring Dr. Leib faced the tired and nervous reporters and spectators. He spoke haltingly: "Gentlemen, I—I'm sorry. The—the experiment is a failure. For some reason, it is impossible to bring Mr. Parry back to the present time. As I've told you—many times—time

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A question that is often raised but seldom answered . . .

Has it all happened before?

By FRANK WILSON, B.Sc.

SOME PEOPLE BELIEVE THAT we are not the first civilisation on Earth to reach a high degree of technology. Could there have been people here many thousands of years ago who knew about radioactivity and perhaps some of our other scientific toys? That is certainly the theme of many famous science fiction stories—especially those that postulate an atomic catastrophe in the remote past, followed by a begin-all-over-again phase; the idea being that this incredibly ancient civilisation was technological enough to bring about its own holocaustic destruction.

And a number of non-fiction works have accepted similar ideas, mainly books dealing with Atlantis and flying saucers. Desmond Leslie, for example, in his *Flying Saucers Have Landed*, claims that there is evidence that a people

living before the Flood were able to build spaceships and to manufacture some kind of radioactive weapon.

The evidence put forward by these authorities is entirely documentary. Though, of course, it cannot be proved that an advanced civilisation did *not* exist long ago, yet it may be pointed out that no material remains are available to indicate their existence. It may seem strange to some minds that the writings of a civilisation should be preserved rather than the solid objects they used. All known ancient peoples are represented in the museums by material relics of a varily primitive kind far removed from anything technological. It may also seem strange that descriptive records should linger and yet early known civilisation should have to develop their cultures from

scratch, without, apparently, benefit from those who went before.

The earliest known civilisations accepted by the archæologists are those that occurred around the rivers Tigris, Euphrates, Indus, Nile, and in China—around 8000 to 4000 B.C. Thus Babylon, Egypt, India and China are the sources we should examine in a scientific study of the earliest technologies. Of course, much of our knowledge of these ancient cultures has been derived from documents, too; but in these cases we also have the incontrovertible evidence of objects found in tombs, temples and a great many excavation sites. Though we might question the interpretation of the documents, we must accept the *material* evidence.

The first sign of ordered thought seems to have been a calendar. The Egyptians had one in 4241 B.C. but the Babylonians did not stabilise their year until about two thousand years later. The reason for the early appearance of the calendar was that agriculture played so large a

part in the economy of those times, and efficient farming is impossible if the farmer does not know what part of the year he is in and when the drought will come and so on. The reason why the Egyptians standardised their calendar so long before the Babylonians was that the regular annual flooding of the Nile set a natural beginning to their year, whereas the Babylonians had no such obvious uniform change of environment to help them.

WRITING

Though the Egyptians had an alphabet of twenty-four letters before 3000 B.C. they wrote with reed pens—not, as far as the evidence goes, with typewriters or printing machines. The Babylonians could also write, but they had to do it by scraping grooves in lumps of clay mud. Communication by writing is a most important factor in the development of a technology, and it seems hardly likely that the Egyptians and Babylonians would have used these primitive methods if a high technology had preceded them.

It would be hard to conceive of an advanced technology developing without the aid of mathematics. Even today, when, though we *can* build atom bombs, we *cannot* build spaceships, mathematics has infiltrated into practically every branch of industry and science. Yet the Egyptians and Babylonians could only add and subtract and do multiplication by a clumsy roundabout method. True, considerable progress was made, for within about two thousand years the Sumerians of Babylonia had multiplication tables, tables of squares and cubes, a decimal system, and angular measurement. All this is to be seen on the clay tablets that have been found. But the more complicated mathematical concepts which form the basis of engineering did not appear for thousands of years.

The old adage, "Don't run before you can walk," would seem to hold as much sense for the people who lived six thousand years ago as it does for us today. Yet, we are asked by some people to believe that ancient peoples

tried to reach the planets and yet left behind nothing that would help a subsequent civilisation to travel effectively *on Earth*. From documents, carvings and various material remains we know that the vehicles of these early peoples were crude and clumsy. Land travel was represented by nothing more elaborate than the chariot—which must have been looked upon as the height of mechanical perfection, for it frequently had metal rims to its wheels! Carts, which were much more numerous, had to make do with wooden wheels and often with mere logs. Their progress must have been bumpy and uncomfortable in the extreme.

WATER TRAVEL

Travel on water was by barges and reed boats. Even the sail had not been thought of as an aid to propulsion. Motive power still had to be provided by human hands and shoulders. But, of course, these "civilisations" had plenty of slaves to do this work. These peoples had no incentive to sail away from their homelands; they thought their

homelands were the whole world—and the earliest “maps of the world” are really maps of small regions flanked by sea and river! Maybe we are prejudiced by the development of our own civilisation, but we find it difficult to conceive of a people travelling through space and not travelling on their own planet—even across land.

If we use the term “astronomy” in a rather wide sense to mean any kind of interest in celestial matters, then we have to admit that astronomy existed among the very earliest civilisation about six thousand years ago, and probably before that. Indeed, it is quite likely that the arboreal savages from whom we are descended gazed with a vague kind of wonder at the night sky. This was probably the beginnings of a glimmering of intelligence, for the lower creatures do not seem to be a bit interested in astronomy.

But the first attempts at systematic study of the heavens appears in the Babylonian records of the movements of Venus. These records were written about 2000 B.C. Pro-

gress in astronomy was rather slow, partly because it was so inextricably linked with astrology, and partly because there were no telescopes. Can we admit the existence of highly complex machines like spaceships in a technology from which simple optical instruments were missing?

Not for many thousands of years did the concept of solid celestial bodies arise. They were regarded variously as gods, lamps, and a kind of abstract lights. Surely an earlier civilisation that knew space travel would have left behind—even after the most widespread atomic damage—information that would have obviated these naive ideas.

Again, it is hard to conceive of a civilisation that was so preoccupied with mechanical and engineering advances that it neglected the study of the human body. Yet medicine in the earliest known civilisations was rude, illogical and based upon superstition. Sorcery was the cure-all of the Babylonians, but the Egyptians have the honour of producing the world's first recorded physician, Imhotep,

around 4500 B.C. Their carvings indicate that they had oculists, surgeons and bone setters. Mummified remains have frequently shown traces of surgery. But there can be no doubt that these various approaches to medicine were irrational and fallacious—not in any way based upon a knowledge of the working of the body. Any scientific approach to disease was totally lacking for several thousand years.

A scale indicating the use of decimals has been found in Indian excavations, and we know that they had medical schools, a little knowledge of anatomy and medicinal plants. We also have evidence that ancient peoples in South America knew some astronomy, but nothing has been found that indicates any more knowledge than the Babylonians and Egyptians had.

Time and time again in the history of known peoples we find that a subsequent civilisation has built upon the know-

ledge and teachings of a previous civilisation. For example, the Greeks came after the Babylonians, and their greatness lay in their ability to learn from the earlier cultures—they went to Egypt to learn astronomy—and to correlate this knowledge and divorce it from ideas of magic such as astrology, numbers and geometrical figures. Even the Greeks, who were renowned for their mathematics, philosophy, sculpture, poetry and medicine, were not by any means technologists. Their ideas were largely theoretical and as far as we know they had only the simplest of tools, instruments and vehicles.

Thus, though the idea of an ancient great technology is interesting and attractive, we have to admit that there is no scientific evidence in support of it. As far as we can tell from all the unquestionable evidence, our present technology is the highest the world has ever known.



NON-FICTION

Mr. Patrick Moore has drawn our attention to the review of his book, *THE TRUE BOOK ABOUT WORLDS AROUND US*, which appeared in the December issue of this magazine. Mr. Moore points out that the review is inaccurate, a complete misrepresentation of the facts and an unwarrantable personal attack upon him—as evidenced by favourable reviews elsewhere, notably by the Astronomer Royal. *Authentic*, therefore, wishes to withdraw the review and to make it clear that no personal attack was intended. We tender our apologies to Mr. Moore.

FLYING SAUCERS AND COMMON SENSE is the best book yet that we have read on the great flying saucer controversy. It is by Waveney Girvan, who published *Flying Saucers Have Landed and Is Another World Watching Us?* It is mainly an account of stories behind books, articles, broadcasts, sightings and rumours of flying saucers, and Girvan

quotes many sceptics at length. We are most pleased to see how this layman lays bare the illogicalities in the arguments of the "scientists," for we have long deplored the thoroughly prejudiced statements of many experts who should have known better. Various famous photographs are discussed with a view to the possibility of their being faked (*not* categorically stated to be fakes, as was done recently by a rather eminent personage). Unlike so many books on flying saucer topics, this one is not padded in any way. It is full of "meat" and is essential for anyone at all interested in the topic. We only hope you do not think that *all* scientists are so unscientific as the ones who have proclaimed the impossibility of flying saucers. Published by Frederick Muller (110 Fleet Street, London, E.C.4, at 10s. 6d.)

FRONTIER TO SPACE is Eric Burgess's second book. You will remember that he wrote the admirable *Rocket Propulsion*. This one is just as good, just as erudite, just as full of detailed information as the other. It is concerned with the design, structure, manipulation and significance of high altitude rockets, together with the implications of the results of high altitude research. It is crammed with many rare illustrations of rockets and their components, with special reference to the telemetering gear. We are rather suspicious, however, of the photograph that faces page forty. This is said to be a photograph of the Earth taken at a height of 108 miles, but Earth looks very small. For anyone seriously interested in rockets but who is bored by the mathematics so often associated with this subject, *Frontier to Space* will prove of great value. It is published by Chapman and Hall (37 Essex Street, London, W.C.2) at 21s.

A welcome second edition is **THE HUMAN USE OF HUMAN BEINGS**, by Dr. Norbert Wiener, the cybernetics pioneer. Wiener has for long applied the feed-back

and other principles of electronics to the functioning of animals—being careful not to claim that our nervous systems are *built* that way—and in this book he shows how the use of complex electronic devices can give mankind greater freedom for performing tasks that seem to be beyond the range of mechanical instruments. His thesis—most ably and clearly expounded—is that humans are now being wrongly used, although less so than previously, and that by incorporating machines more and more into the running of society we can ensure—the human use of human beings. This is a thoughtful book, not to be lightly skimmed. It holds great fascination and is very highly recommended. Published by Eyre & Spottiswoode (15 Bedford Street, W.C.2) at 18s.

MICROBES AND US is one of those Penguin books that opens up a whole field of science to the general public by its lucid exposition and informal approach. Hugh Nicol, who wrote *Microbes by the Million*, has done something that probably few other people could do—present the main findings of

bacteriology in a way that is both informative and intriguing. So many people think that these tiny plants are only "germs," but Nicol adequately presents them as occupying a most important place in our lives quite apart from their pathogenic effects. This is a most outstanding book and we recommend it extremely highly. Published by Penguin Books (Harmondsworth, Middlesex) at 2s. 6d.

Another really good Penguin is **SEX AND SOCIETY**, by Kenneth Walker and Peter Fletcher—two men well qualified to write such a book. The theme cannot be stated better than as by the publisher: "The authors trace the course of sexual development from infancy to maturity and examine the commoner sexual neuroses and deviations in the hope of ascertaining some of the effects upon human nature of the social and economic pressures of our time." This is true, and thus the book has a wider and deeper scope than most other volumes on the same subject. Read in conjunction with Georgine H. Seward's *Sex and the Social Order* (reviewed in No. 51), it should give the reader a very sound

and rational—though perhaps a little unorthodox—understanding of this most important facet of life. Published by Penguin Books at 2s. 6d.

THE HANDBOOK OF THE BRITISH ASTRONOMICAL ASSOCIATION makes its welcome appearance once again. This sixty-page booklet is quite full of essential data for the amateur astronomer, giving the positions of all the common celestial bodies right through the year. To non-members it costs 5s. from the Association's registered office at 303 Bath Road, Hounslow West, Middlesex.

THE JET AIRCRAFT OF THE WORLD, by William Green and Roy Cross, is a massive book, splendidly produced and most lavishly illustrated with hundreds of photographs and almost as many excellent drawings. As the title implies, every type of jet 'plane ever produced in any country in the world is included. This is a complete catalogue of the world's jet 'planes to date, together with expert, accurate and comprehensive text descriptions. The material is laid out chronologically, so that the reader may trace the detailed

evolution of present-day types. The price of 30s. is by no means too much. Published by Macdonald (16 Maddox Street, London, W.1).

For those with an interest in living things, **GENERAL BIOLOGY**, by R. B. Whellock, will prove most useful. It is very elementary, being designed as revision notes for the G.C.E. examination, but nevertheless deals with all the fundamentals of this fascinating subject. Very well illustrated, of large size and with a commendably lucid text, we can recommend it confidently. Published by Harraps (182 High Holborn, W.C.1) at 9s.

FICTION

THE TREASURY OF SCIENCE FICTION CLASSICS is a big, thick American book containing snippets, and some complete material, from all the best-known science fiction pieces of the past—Verne, Wells, Conan Doyle, Huxley, Stapledon and people like that. Allowing for the frustration that must come with snippets of great works (four novels are complete and one slightly abridged) this is an excellent book and is undoubtedly worth the \$2.95

asked for it by Hanover House (575 Madison Avenue, New York 22).

ASSIGNMENT IN ETERNITY is a collection of four stories by Robert A. Heinlein—gangster-in-the-future, time travel, esp, and a thought-provoking one about anthropoid apes and men. All are fast moving and good, but not Heinlein's best by any means. The book is a selection for the Science Fiction Club of Museum Press (26 Old Brompton Road, S.W.7) and costs 9s. 6d.

BEST SF is a collection of fourteen stories by well-known British and American authors, edited by Edmund Crispin. Though most of this material is exceedingly familiar to the science fiction fraternity, its coming out under the imprint of a most reputable publisher will do the *genre* considerable good. A goodly few of the stories have already appeared in Britain, but their reappearance here cannot fail to make the critics of science fiction sit up and tell themselves what fools they've been. All hail to Messrs. Faber and Faber (24 Russell Square, W.C.1) for sponsoring this excellent book at 15s. (Even the price will show that not

all science fiction is both cheap and nasty!)

NINE TALES OF SPACE AND TIME, edited by Raymond J. Healy, comes from the science fiction shelf of Weidenfeld and Nicholson (7 Cork Street, W.1) at 10s. 6d. It contains, as you would expect, nine stories; they are by some of the best-known names in the field and are all wellworthy of anthologisation. We have no difficulty at all in recommending this title to everybody who wants good science fiction on their bound-book shelves.

SCIENCE FICTION ADVENTURES IN DIMENSION is another Groff Conklin anthology, fully up to the standard of his others. Again, the names are all well-known and the stories are all worthy of preservation, though one or two only just make the grade. There are fourteen stories altogether. Recommended for all those who do not have the American counterpart. Published by Grayson & Grayson (16 Maddox Street, W.1) at 9s. 6d.

In **SEEDS OF LIFE** we have an example of what a trained scientist can do with

science fiction. Keeping within the bounds of possibility and flouting no known laws, author John Taine (who is Professor of Mathematics at California Institute of Technology) produces a story rich in power and imagery, with all the ingredients of classic science fiction brought up to date. True, the main theme is far from original. Taine is too great a writer to waste his time looking for new plots. Instead, he takes the old idea of mutants formed by radioactivity and dresses it up in a fashion most intriguing and entertaining. We recommend this very highly, for we are sure you will not be disappointed. Published by Rich & Cowan (Stratford Place, W.1) at 9s. 6d.

THE MOON RAIDERS is by an author not unknown to readers of this magazine—Sydney J. Bounds. It is a tale of seven-foot high bats and their stronghold on the Moon, and the way they can teleport Earth's metals to their flying saucers. A love story is interwoven with the main plot, which has action in plenty but very little science fiction. Published by W. Foulsham (20 Red Lion Court, Fleet Street, E.C.4) at 8s. 6d.

PLANETARY EXPLORATION

Continued from page 69

great temperate regions. We shall make verdant pastures, grainlands and fruiting orchards a million acres at a time.

This survey, then, will be my first and most important project. There will, however, be several other tasks for me, official ones and little private pursuits of my own that will be possible in between territorial traverses. If there is no atmosphere I shall need a jet propelled vessel rather than a helicopter, and I shall also have to gather samples of surface dust and examine them for chemical composition and grain size as part of the preliminary work towards blending on a vast scale to produce arable soils. On Earth it took millions of years of flowing rivers and drying seas and changing river beds to provide such soils ready mixed for Man's purposes before Man appeared on the Earth.

I shall not need to do any prospecting in the old sense of the word to detect deposits of metallic ores, mineral salts, building stones, etc., since all these will be revealed when my survey work has been translated into models for detailed analysis after our return.

Should there be water I shall collect samples for preliminary on-the-spot analysis by my chemist colleague, the results of which will interest me as indicating through which of my geological strata the feeding stream will have percolated. It will be for others to decide whether these waters are potable or suitable for irrigation, etc.

THE MAGIC RING

Do you remember the Prince who was given a ring which pricked his finger whenever he began to entertain an evil thought or to form an unwise intention? I am taking with me a very similar device. Radioactivity, that is to say spontaneously splitting atoms such as are found almost everywhere on Earth in small concentrations, may occur with dangerous intensity in the surface rocks of another planet. Remember how, in the early days of atomic power, people carried Geiger counters with which to detect the rays from lingering contaminations? Since then, of course, we have developed much more sensitive means of detection of all manner of moving particles. I have one of my own. Let into the front of my helmet there is a little panel which will respond to anything in the way of a particle which, by virtue of the combination of speed, weight and numbers arriving per second, may constitute a danger to my body. As a result a little pin will prick the now yearly spreading bald patch above my forehead. A similar panel let into another portion of my space suit will warn me of dangerous emanations which may be from sources behind me. My gauntlets and my boots will similarly prevent my grasping dangerous materials or from misguiding my steps.

My little private quests? I'm going to look for fossils.



Projectiles

OVERSEAS SECTION

INCREDIBLE

Authentic No. 53 arrived a day or so ago and has been devoured from cover to cover. I even figured out how much of my wage packet is ending up in smoke due to my short-sightedness in neglecting to use "Apal." The amount turned out to be about 78.001%—a pretty amazing figure considering I don't smoke. Further examination uncovered the nasty fact that I don't have a wage packet either, and you'll admit this adds precious little to the credibility of the whole thing. Still more incredible is the apparent offence taken by Mr. Eric Bentcliffe. Had you called me a misfit, I'd have written you calling you a jolly old slob and thanking you for an excellent stepping-stone to BNF status in fandom's madhouse.

Bill Warren, 615 East Block St.,
El Dorado, Arkansas, U.S.A.

Nice to hear from you, Bill—especially when we know how difficult it is for you to write a letter. Mean to say you didn't know how much non-existent money you were wasting on non-existent tobacco? You'll never make a pure mathematician, friend!

N.Z. CLUB

I am a young New Zealander who likes good science fiction. I like *Authentic*. I do not like American S.F. Your covers right now are top rate—keep them that way. The articles are good, although I must confess, a little more knowledge on my part would help me understand some of them. Please don't get too technical. Now, about New Zealand. Every month the number of SF mags in the shops is tremendous. There are hundreds of fans who buy and read them. All over N.Z. But—as far as I know—there are no clubs, organisations, or gatherings of any sort—that I know of. I've hunted and looked everywhere, but not a group! Is N.Z. dead, or just hollow? I am only fourteen, but if no one is

willing to start one, then I will. Do you know of one? I want a pen friend (or a dozen) about my age preferably, interested in S.F., Astronomy, and Space Travel. Richard Paris, 90 Coromandel St., Wellington, S.I., N.Z.

The only club we know of, Richard, is the Christchurch Science Fiction Club, 2 Curries Road, Hillsborough, Christchurch. Why not contact them? And no doubt you'll be getting some pen friends now.

GRUMBLES

Whilst I am not an "expert" fan (to be perfectly truthful I can't always get a *clear* picture of what the factual articles are about) I am an artist of sorts (an interior decorator, to be precise) and honestly, some of the line drawings which have appeared in your magazine are pretty ghastly. The trouble is that the covers are so good that, by comparison, the interior illustrations appear worse than they actually are. I don't agree with Mr. Rowden (Projectiles No. 53) that illustrations are a waste of space, but I do feel that if for any reason it is not possible to keep them up to the standard of the covers, then you're better off without them! Also, I'm afraid that (to me, at any rate) "Special Sixteen-page Pictorial Supplement" was an *extremely* misleading way of describing sixteen pages of copy printed on art-paper, plus one or two scrappy little pictures on *some* of the pages. I must admit that I had been wondering how you were going to manage sixteen pages of pictures and still publish at 1s. 6d., but I *still* felt rather

"let-down" when I saw what sort of an effort it was.

I'm sorry that this has been a succession of grumbles, but they're only trivialities, since I would still keep up my subscription if you commissioned a five-year-old to illustrate for you. Just keep the stories as entertaining as they have been so far and I'll be happy.

D. Stubbs,
Khartoum Technical Institute,
Box 407, Khartoum, Sudan.

Sorry we've been disappointing you, Mr. Stubbs.

BACK NUMBERS

There are a few mags I need to complete my set of *Authentic* up to date. I wonder if you or your readers could help me. The numbers are: 1, 2, 5, 6, 9, 10, 11, 12, 13, 16, 21.

Galvin L. Edser, 20 McCurdy Street,
Upper Hull, Wellington, N.Z.

We don't hold out much hope for you, Galvin, but maybe there are a few back numbers knocking around somewhere.

SWAPS

Although I do not subscribe to *Authentic*, I read every issue. You see, I purchase Stf mags and books from Readers' Service Book Co. in California, and purchase *Authentic* from them. In fact, for a while I was afraid to purchase a copy because Stf from England had been below the quality found in the U.S. However, after reading a couple of copies of *Authentic*, I purchased all of the back issues

and purchase all new ones as they come out. *Authentic* will equal any of the Stf mags we have in the U.S. I have a pile of Stf mags, pocket books, etc., that I will swap to any of your readers for other Stf mags or I will swap them for stamps. I am a stamp collector as well as a Stf fan and would be willing to swap the mags for stamps. Keep up the good work and be sure to keep Projectiles. Many of the U.S. mags have taken out the letter sections, and I for one think that the letter section is one of the most interesting sections in the mag.

James R. Harris,
3226 Hampton Street, Ashland,
Kentucky, U.S.A.

Glad to welcome you to the fold, James. No doubt some of our readers will get in touch with you about swaps. While we keep getting letters telling us how good we are, we'll continue to publish Projectiles!

•

HOME SECTION

ERROR?

There is a glaring error in your description of Jupiter and that is that our skeletal structures could not support a gravity of 3 x Earth, and that we would be *crushed to pulp*. A moment's thought would show that this is simply *not so*. Obviously our legs would be the first to go, as they support everything else. Thus, you are stating that the skeletal structure of a man weighing, say, 11 st. would crumble under a further load of 22 st. Now, all over the world, amateur 11 st. weightlifters are

hoisting overhead 300 lbs. and more. I have myself, at a weight of 11 st., *supported* on my shoulders a weight of 450 lbs. Whatever you may deduce about the *muscularity* of a weightlifter, you must concede that owing to his higher muscle: bone ratio he must have a *lighter* skeletal structure than the average man of 11 st. I am, I admit, a relatively new reader of *Authentic*, but in future a regular one. I would like to congratulate you on your "cater-for-everyone" technique—particularly your articles, which, by themselves, put the mag in the front rank, while your all-round selection of stories keeps it there.

F. Smith, 175 Villiers Street,
Preston, Lancs.

There's a time element in this, Mr. Smith. Put that 450 lbs. weight on your shoulders again and try keeping it there, not for a lifetime but just for, say, an hour. But don't blame us if you're pulped as a result! Sure you could lift 300 lb., but could you ride a bike with it? Could you do anything but just stand and tremble and hope to God you can put it down soon? Us—we'd collapse at the thought almost!

REVOLTING

After reading No. 54 I felt I had to write to state my opinion. The story *The Lesser Breed* was very good, but I have never had the misfortune to read anything so horrible as the two stories: *Non-entity* and *Death Wish* before. They reeked of blood on every page. If we wish to read this kind of stuff there are plenty of horror comics on sale at all bookstalls. If this is E. C. Tubb's or Eric Wilding's

idea of good SF, then I'm afraid it is not mine. For people like myself who are genuinely interested in the possibilities of space travel, the idea of men's heads being used as part of the equipment is rather revolting.

P. A. Lee, 29 Charleston Street,
Walworth, S.E.17.

Of course it's revolting. Do you think we were saying this is a wonderful happy thing? Every now and then we like to point out that man has not yet reached the depths of depravity.

GHOSTS

I very much enjoyed Frank Wilson's article on Bems but, while agreeing with everything he says, I would like to draw his attention to a motto on the wall of the Sikorsky Aircraft Factory in the U.S.A., which says: "According to all known aerodynamic principles a bee should not be able to fly, but it ups and flies anyway." And it may well be that a Bem might levitate by means of a modified poltergeist effect.

Alan Burns, Goldspink House,
6 Goldspink Lane,
Newcastle-upon-Tyne.

The point you may be missing, Alan, is that a bee does not fly in accordance with aerodynamic principles, whereas airplanes do. If BEMs are not constructed on biological principles they will not be life as we know it, and that is all that Wilson maintained. Poltergeists there might be—and invisible little men all around us, but we won't get very far by basing our lives on these possibilities, will we?

JUPITER'S AIR

Congratulations for keeping *Authentic* at the top. It is a fine job you are doing for us, the S.F. fans. *Authentic* No. 52, as usual, was better than the preceding one. Coming to the real purpose of this letter. In page three of *Authentic* No. 52 the atmosphere of Jupiter is described as being "made of methane and ammonia and a few other gases," which gives the impression that methane and ammonia form the greater percentage. Now, the results of experiments performed in 1952, due to the occultation of Sigma Arietis (a 6th magnitude star) by Jupiter, showed its atmosphere to be composed of helium and hydrogen entirely (traces of other gases being present).

V. Djedvet, 32 Grand Parade,
Brighton, Sussex.

Could you give us a reference for that, Mr. Djedvet? All the authorities we can find confirm that we were correct.

LONG OR SHORT?

I view with super dismay the letter of R. F. Short in issue 53. Personally, I like your magazine as it is—that is, if you'd only get rid of your long story effort with each issue! Let's have a plain vote—FOR or AGAINST long or more short stories in your mag. Keep up your most interesting non-fiction department—but please, not too much. I'd like to make contact with any Aussie reader—I've got quite a few British S.F. efforts and wish to swap for "Aussie" S.F. Any takers, Australia?

Lex Arnold, Federal Scout Corps,
Tyne District, Via BM/Newscout,
London, W.C.1.

We've already had a vote. Didn't you see the Poll in No. 53? Result was a tie for long and short stories. What are we to do?

FACT AND FICTION

I have been asked to write and inform you of the existence of the SFFC, now eight weeks old and (boasting) eighteen members. Our meetings are held weekly at the Post Office Inn, the landlord allowing us the room free of charge, every Thursday. We are now embarking on an advertising campaign and at great expense inserted a small ad. in the local paper, as a result of which we received a half column of free publicity. I am hoping this letter will have the same effect on *Authentic*. We are also considering having a slide shown at local cinemas, and intend to produce a fanzine when we get organised. The club has a rapidly growing library of science and S.F. books and magazines. At times it has descended *en masse* on lecturers on scientific subjects. We would welcome visitors from any other S.F. Clubs.

V. K. Hardy,
Science Fact and Fiction Club,
c/o Post Office Inn,
Higher Market Street, Farnworth.

That's the way to go about forming a club! None of these half measures for Farnworth, eh? Keep us informed of your progress, please.

FEMME (FATALE?)

Having read your magazine for some time I have decided to honour you by writing! The subject of this letter is as follows:—Am I the only female science fiction fan in this country? Upon meeting a certain young man, the subject of reading matter arose, and on confessing a great liking for the above subject, he looked at me, amazed. It was a favourite topic of his also, but I think finding a female who could talk, think and see S.F. frightened him away (and I am not a BEM!) I must add that my brother is the one who converted me. Now we have S.F. books and mags in *all* corners of the house, and a welcome mat (or supersonic ray gun) ready for the first visitor from space—be he tall, dark and green, or just a flat blob of gaseous substance. Hoping this may reach the printing press, and show the other would-be science fiction fans (female) that they are not alone in their madness!

Patricia Baddock,
15 Wisteria Road, S.E.13.

We've had letters from several female fans, Pat—you don't mind us being familiar, do you—and we're convinced that there are many of them. We keep trying to get them to form a club. What about you having a go? We'll give you all the publicity you need. And why don't you come along to the Globe in Hatton Garden one Thursday evening? You'll meet other girl fans there.

They Come from Outer Space—Continued from page 88

per second and wiped out a forest near Kharkova Village. At the time a Russian scientist put forward the theory that it was a spaceship from another world, but as far as is known no little green men were found in the crater. One wonders what became of the scientist, and if he read science fiction.

In 1938, a 4 lbs. meteor went through the roof of a garage in Illinois, through the top of a Pontiac coupé inside, through the seat cushion, bounced off the exhaust pipe and eventually ended its journey . . . how long? how far? . . . amongst the car's springs. It came down with a roar like a crashing plane, and mystified the occupants of nearby houses until the hole in the garage roof was noticed. In 1876 a Shropshire farmer heard a rumbling and an explosion, and an hour later found a hole in one of his fields that yielded a meteorite weighing 7½ lbs., and still warm.

A 1946 meteorite broke up a swimming party in Texas by plunging into the swimming pool. Later, 155 lbs. of fragments were dredged from the bottom. But luckily, all these modern near-misses have been by comparatively small meteorites . . . that is, compared with the Siberian and Arizona giants. There are no modern instances of any person being killed, and the older cases are too hazy in time or authenticity to be verifiable.

When it's remembered that the earth has a surface area of nearly 200,000,000 square miles, over half of it covered by water, the chances of any large-scale destruction resulting from a direct hit on a city seem vanishingly small . . . but are still there. To spaceship designers and flyers, this debris of space, motes like sand-grains up to 1,000 ton boulders, may prove a nuisance and more than a nuisance. To us . . . mere streaks of fading fire in the night sky, we hope.

PARRY'S PARADOX

Continued from page 110

is—is full of paradoxes. I—I wish to announce at this time that I am discontinuing my time travel experiments . . ."

A murmur of protest arose, mostly from the few scientists who were friends of Leib. One stepped forward. "Bruno . . ."

The doctor motioned him back. "No, Carl. My decision is final. We are not intended to tamper with the time stream. I will dismantle my machine." He kicked at it futilely. "Tonight I have come to see it only as a guillotine, and I, the executioner. Now I'm tired. I want to rest. Excuse me, gentlemen." He turned and walked slowly out of the room, shoulders sagging. Something had gone out of his eyes.

The spectators began to drift away. The scientists murmured quietly to each other, a few theorizing, others expressing concern over the condition of Dr. Leib.

Bonner Parry had been almost forgotten. But not quite. One of the photographers, packing his equipment, remarked to the other: "That Parry fellow really had courage. I hope that at least he landed somewhere where he can cash in his jewels."

The other nodded as he glanced at his watch. "It's after midnight. We better rush these films by the office tonight if we're going to make next week's edition."

Bonner Parry lay on his bed reading a magazine entitled UNUSUAL WAYS TO MAKE MONEY. He glanced at his watch. It was two o'clock. He laid the magazine aside, buttoned his shirt and put on a tie. It was time to start. The experiment was only an hour away . . .

HOW MUCH OF YOUR WAGE PACKET



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M.S., Chingford.

Dear Sirs,

I am writing to say thank you for your APAL. It has worked wonders. After smoking 40 cigarettes a day, I have stopped smoking.

H.M., Dumfriesshire, Scotland

Dear Sirs,

It is a year ago last November that I topped smoking, with the aid of APAL. No cigarette has touched my lips since the day I received the APAL. I sleep better and have not had a cold since, and I am saving 24/6 every week.

G.A.S., Ossett, Yorks

Dear Sirs,

I am very pleased with my APAL. I have been much better in health since using it. It certainly takes away the longing for a smoke. Thanking you very much.

Mrs. C.A.H., Coventry

Dear Sirs,

Fifty cigarettes a day for over twenty years is pretty good going and nobody would have me believe that I could ever give it up. Your APAL arrived four and a half weeks ago and I am delighted to say that I have not smoked since.

F.F., Hertford.

Dear Sirs,

I bought an APAL from you nearly eighteen months ago, and it did for me all that you said it would. I have not smoked for seventeen months, and have no desire at all to do so.

G.H., Marham, Norfolk.

Send stamped, addressed envelope for full particulars, free advice and proof.

HEALTH CULTURE ASSOCIATION

(Room 19) 245 HIGH HOLBORN, LONDON, W.C.1

THE AUTHENTIC ALPHABET POLL

Please read the Editorial before looking at this page

Below are twenty-five suggestions for the improvement of *Authentic*. Please tick those with which you agree, and do nothing about those with which you disagree. For example, if you think that we now carry the right balance of fiction and non-fiction you will not tick either c or d. We shall then know what you mean. If you think *Authentic* can't be improved, then don't tick anything!

Authentic could be improved by having:

- | | |
|---|---------------------------------------|
| a Fewer, longer stories..... | o More psychological stories..... |
| b More, shorter stories..... | p More sociological stories..... |
| c More fiction..... | q More Projectiles..... |
| d More non-fiction..... | r Less Projectiles..... |
| e More illustrations..... | s Some kind of puzzle feature..... |
| f Less illustrations | t Author biographies..... |
| g Serials..... | u Story ratings..... |
| h More science in the stories | v More stories by.....* |
| i Articles on the elements of various sciences..... | w More American stories..... |
| j Single columns..... | x Reprints of "classics"..... |
| k Narrower margins..... | y A "sales and wants" section..... |
| l Less science in the stories..... | z A "questions answered" section..... |
| m More space stories..... | |
| n More time travel stories..... | |

* insert here the name of any one author who has appeared in *Authentic*

Now list here the letters you have ticked, in what you consider is their order of importance.....

If you have an additional suggestion, make it here

.....



Now rip out this page, write your name and address in the margin and send it in an unsealed envelope (1½d. stamp) to:

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